JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

List of all the Value Added Courses Offered during the Last Five Years

S. No	Course Code	Course Name
1	18B1WCI743	Advanced Algorithms
2	18B1WBI631	Advanced Algorithms for BioInformatics
3	18B1WCI837	Advanced Computer Architecture
4	10B13CE744	Advanced Concrete Technology
5	18B11CI511	Advanced Java
6	18B1WCE831	Advanced Reinforced Concrete Design
7	18B1WCE631	Advanced Structural Analysis
8	17B1WCI833	AI : Knowledge Representation and Reasoning
9	10B13CE742	Air Pollution Monitoring & Control
10	19B1WCI740	An Introduction To Statistical Learning
11	16B1WEC831	Antenna And Wave Propagation
12	14B1WBT736	Antibody Engineering Technologies
13	18B1WEC533	Applied Artificial Intellegence
14	21M1WEC233	Applied Machine Learning For Iot
15	19B1WEC836	Applied Medical Signal Processing
16	19B1WCI635	Architecting Distributed Cloud Applications
17	13B1WCI731	Arm Based Embedded System Design
18	20B1WCI731	Artificial Intelligence
19	18B1WEC838	Artificial Intelligence Techniques
20	20B1WEC735	Artificial Intelligence Techniques For Genomic Signal Process
21	20B1WEC731	Automation And Robotics
22	15B1WCI833	Big Data Analytics
23	18B1WEC841	Bio Electronic Sensors
24	18B1WBT634	Bioenergy & Biofuels
25	20B11BI311	Bioinformatics Data Management
26	18B11BI313	Biological Computation
27	12B1WCI732	Biometric Recognition Techniques

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Dean (A&R)
Jaypee University of Information Technology Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

28	21B1WBT832	Bioprocess Modelling And Simulation
29	14B1WBT741	Bio-Resource & Industrial Products
30	18B1WBT731	Biosensors- Principles & Applications
31	18B1WCI836	Block Chain Technologies
32	13P1WHS232	Brand Management
33	11M1WCE133	Bridge Engineering
34	18B1WHS632	Business Analytics
35	18B1WCI637	C# And Vb.Net
36	19B1WEC832	Cad Algorithms For Synthesis Of Digital Systems
37	20M1WBT234	Clinical Diagnostics
38	18B1WBT737	Clinical Trials and Database Management System
39	12B1WCI831	Cloud Computing
40	19B1WCI835	Cloud Computing Security
41	20B1WCI532	Cloud Computing: Concepts, Technology & Architecture
42	13B1WEC731	Cmos Analog Circuit Design
43	14B1WEC733	Cognitive Radio Networks
44	18B1WBT532	Comparative & Functional Genomics
45	18B11CI612	Compiler Design
46	19B1WCI731	Computational Data Analysis
47	18B1WBI831	Computational Molecular Evolution
48	20MSWBT433	Computational Systems Biology
49	18B1WCI733	Computational Techniques And Algorithms
50	18B11BI612	Computer Aided Drug Design
51	19B1WCI633	Computer Animation
52	21B1WCE871	Computer Applications In Environmental Engineering Lab
53	17B1WCI812	Computer Games
54	18B11CI515	Computer Graphics
55	18B11CI611	Computer Networks
56	18B11CI514	Computer Organization and Architecture
57	19B1WEC633	Computer Vision

IQAC

Dean (A&R)

Assistant Registrar (Academics)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

58	18B1WCE641	Construction Management Computations
59	21B1WCE832	Construction Planning And Control
60	10M11CE111	Construction Techniques
61	18B1WHS831	Contemporary India : Chlngs Of Democ & Dvlopmt
62	18P1WHS101	Contemporary Issues In Indian Economy
63	18B1WEC531	Control Systems
64	18B1WCI734	Cryptography& Network Security
65	18B1WCE736	Dam And Reservoir Design
66	18B1WCI843	Data Analytics
67	18B1WCI532	Data Compression
68	18B11CI613	Data Mining
69	18B1WCI635	Data Mining & Data Warehousing
70	20B1WEC831	Data Science Using Python
71	18B1WCI631	Data Structure And Software Design
72	18B11CI313	Database Management Systems
73	18B1WBI632	Dataware Housing and Mining for BioInformatics
74	18B1WCI835	Deep Learning -CSE/IT
75	18B11CI412	Design & Analysis of Algorithms
76	18B1WCI835	Design & Analysis Of Multidimmensional Data Structures
77	17B1WCI814	Design and Analysis of Real World Algorithms
78	18B1WEC732	Design of Dependable Systems
79	18B1WCE735	Design Of Prestressed Concrete Structures
80	20B1WCE732	Design Of Reinforced Concrete Structures
81	18B1WBT833	Diagnostics & Vaccine Manufacture
82	19B1WEC831	Digital Cmos Ics
83	18B11EC312	Digital Electronics & Logic Design
84	19B1WCI631	Digital Forensics
85	18B1WCI636	Digital Image Processing
86	21B1WEC731	Digital Image Processing Using Python
87	12B1WEC732	Digital System Design

IQAC

Jaypee University of Information Technology
Dean (A&R)
Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

88	20B1WEC734	Digital Systems
89	20MSWBT432	Drug Discovery And Development
90	19B1WEC635	Embedded System Design
91	10B1WPD731	Entrepreneurship Development
92	10B1WBT737	Environmental Biotechnology
93	18B1WCE732	Environmental Management And Impact Assessment
94	17B1WCE833	Environmental Protection and Sustainability
95	18B1WBT736	Enzymes In Food Processing
96	19B1WCI831	Ethics And Information Technology
97	18B1WCI833	Fault Tolerant System Design
98	10B1WPD737	Financial Planning
99	18B1WCE737	Finite Element Method
100	19B1WBT732	Food Nutrition & Health Care
101	21B1WBT831	Food Processing And Engineering
102	19B1WEC735	Forensic Image Processing
103	18B11CI513	Formal Language & Automata Theory
104	20B1WCI531	Foundation For Data Science And Visualization
105	19B1WCI839	Foundations of Blockchain
106	18B1WEC731	Fpga Based Instrumentation System Design
107	20B1WCI732	From Graph To Knowledge Graph
108	20B1WEC533	Fundamentals Of Digital Image Processing And Applications
109	14B1WEC735	Fundamentals Of Embedded Systems
110	18B1WEC834	Fundamentals Of Next Generation Communication System
111	18B1WBT831	Genetic Counselling
112	10B1WCI733	Graph Algorithms and Applications
113	11B1WCE834	Highway Construction And Maintenance
114	10B1WPD735	Human Resource Management
115	18B1WHS641	Human Rights For Technocrats
116	10B1WCE732	Hydropower Engineering
117	10B1WCI737	Image Processing

IQAC

Dean (A&R)

Assistant Registrar (Academics)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

118	21M1WEC231	Image Sensing And Realtime Processing
119	20B1WEC736	Image Sensing And Reconstruction
120	18B1WBT636	Industrial Chemistry
121	18B1WBT733	Industrial Enzymes Technologies
122	21B1WBT531	Industrial Plant Tissue Culture
123	13B1WHS833	Industrial Sociology
124	18B1WBT632	Infectious Diseases
125	19B1WCI736	Information Auditing & Risk Management
126	19B1WCI833	Information Modeling
127	11B1WCI832	Information Retrieval And Data Mining
128	19B1WCI632	Information Security
129	18B11CI512	Information Systems
130	18B1WCI531	Information Theory & Coding
131	18B1WBT734	Intellectual Property Rights & Commercialization
132	13B1WHS832	International Business Management
133	14B1WHS832	International Human Resource Management
134	18B1WHS634	Internet Marketing
135	15B1WCI832	Internet of Things Architecture And Design (OE)
136	18B11BT413	Intorduction to Bioinformatics
137	19B1WCI738	Introduction To Deep Learning
138	20B2WCI701	Introduction To Industry 4.0 & Industrial Internet Of Things
139	17B1WCI832	Introduction to Internet of Things
140	20B1WEC532	Introduction To Machine Learning
141	19B2WBT701	Introduction To Proteogenomics
142	20P1WHS231	Investment Analysis
143	14B1WHS833	Investment Analysis & Portfolio Management
144	18B1WCI534	Java Programming
145	11B1WMA832	Linear Programming and Applications
146	18B1WCI634	Machine Learning
147	18B1WCI832	Machine Learning Algorithms

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

148	18B1WEC733	Machine Learning And Data Analytics-1
149	18B11BI611	Machine Learning for BioInformatics
150	19B1WEC636	Machine Learning for Data Analysis
151	20B1WEC732	Machine Learning For Wireless Communications
152	20B1WBT631	Manufacturing Process And Industrial Products
153	18P1WHS232	Marketing Research
154	18B1WEC847	Medical Image Processing
155	20B1WBT734	Microbial Ecology
156	18B11EC512	Microprocessor and Interfacing
157	15P1WPH215	Microstrip Antenna Design
158	18B1WEC532	Microwave Components And Devices
159	17B1WCI811	Mobile and Distributed Computing
160	10B1WEC731	Mobile Communication
161	15B1WCI731	Mobile Computing
162	18B11CI413	Modeling and Simulation Techniques
163	18B11EC413	Modern Analog and Digital Communication
164	13B1WEC832	Modern Antennas
165	18B12BT412	Molecular Ecology
166	20MSWBT231	Nanobiotechnology
167	18B1WPH731	Nanotechnology
168	21B2WCI701	Natural Language Processing
169	18B1WCI839	Natural Language Processing Techniques
170	18B1WEC534	Network Analysis And Synthesis
171	11B1WCI836	Network Management
172	10B1WCI735	Network Security and Cryptography Techniques
173	18B1WEC831	Networked Embedded Control Systems
174	19B1WEC631	Neural Networks
175	18B1WEC745	Next Generation Communication Systems
176	18B1WBI834	Ngs Data Analysis & Applications
177	14B1WEC734	Nonlinear and Digital Control Systems

IQAC

Dean (A&R)
Jaypee University of Information Technology
Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

178	18B11CI415	Object Oriented Programming
179	18B11CI311	Object Oriented Systems and Programming CSE/IT
180	19B1WCI734	Object-Oriented Technologies Using Java
181	19B1WCI774	Object-Oriented Technologies Using Java Lab
182	18B1WCE639	Open Channel Flow And Hydraulic Machine
183	21B2WCI531	Operating System Fundamentals
184	18B11CI411	Operating Systems
185	18B1WEC633	Optical Communication Systems
186	18B1WPH732	Optical Fiber Network Design
187	19B1WCI737	Optimization Methods In Business Analytics
188	19B1WEC733	Optimization Techniques
189	11B1WCI834	Parallel Processing
190	19B1WEC732	Pattern Analysis In Machine Intelligence
191	18B1WBT732	Peptides & Therapeutics
192	18B1WCI533	Principle Of Programming Languages
193	10B1WPD734	Principles of Management
194	19B1WCI832	Probabilistic Graphical Models
195	18B11BI414	Programming Languages for Bioinformatics
196	18P1WHS231	Public Finance
197	18B1WCI731	Python Programming
198	18B1WCI535	Python Programming & Applications
199	18B11CI314	Python Programming Essentials
200	18B11CI315	Python Programming with Raspberry PI
201	20M1WBT231	Qc Analysis And Management
202	18B1WHS631	Quality Management
203	13B1WEC834	Quantum Effects In Semiconductor Physics
204	18B1WCI842	R Programming And Applications
205	19B1WEC731	Real Time Operating System
206	19B1WCI837	Reinforcement Learning
207	19B1WEC837	Remote Sensing And Satellite Image Processing

IQAC

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

208	21B1WEC732	Renewable Energy Systems
209	21B2WCE603	Repair And Maintenance Of Buildings
210	15B1WEC732	Rf And Microwave
211	18B1WEC737	Robotic Systems And Control
212	18B11BI512	Scripting Languages for BI
213	18B1WCI838	Secure Web Application Development
214	20B1WHS631	Service Design And Marketing
215	13P1WHS137	Service Marketing
216	13B1WCI831	Service Oriented Architecture
217	17B1WHS832	Six Sigma
218	21M1WEC236	Smart Internet Of Things
219	18B1WCI732	Social And Information Network Analysis
220	18B1WEC851	Soft Computing Techniques
221	11B1WCI731	Software Agents
222	21B2WCI702	Software Engineering
223	19B11CI411	Software Engineering Practices
224	18B1WCI834	Software Reliability
225	18B1WCI633	Software Testing Fundamentals
226	19B1WCI637	Statistics And Exploratory Data Analytics
227	14B1WBT739	Stem Cells & Regenerative Medicines
228	18B1WBT735	Stem Cells And Healthcare
229	18B1WCI736	Storage Networks
230	18B1WHS640	Strategic Management
231	18B1WBI531	Structural Bioinformatics
232	18B1WCE834	Sustainable Development
233	19B1WBT731	Sustainable Technologies For Waste Management
234	20B1WEC531	Switching Theory And Logic Design
235	18B1WEC837	Theory And Applications Of Intellegent Systems
236	17B1WEC731	Time Frequency Analysis And Its Applications
237	18B1WCE634	Transportation Engineering

IQAC

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

238	10B13CE736	Underground Technology
239	18B1WHS636	Understanding India: Literary Reflections
240	20B1WBI831	Virology
241	18B11EC611	Wireless and Data Communication
242	15B1WCI831	Wireless Sensor Networks-Protocols And Applications (OE)

Jaypee University of Information Technology * Waknaghat *
Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT *
IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: May 17, 2017

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Odd Semester 2017).

S. No	Course Code	Course Name
1	10B13CE744	Advanced Concrete Technology
2	12B1WCI733	Advanced Java
3	10B13CE742	Air Pollution Monitoring & Control
4	14B1WBT736	Antibody Engineering Technologies
5	13B1WCI731	Arm Based Embedded System Design
6	14B1WBT731	Bioenergy And Biofuels
7	17B1WHS733	Business Analytics
8	12B1WCI734	C# and Vb.Net
9	14B1WEC733	Cognitive Radio Networks
10	14B1WBI732	Computational Systems Biology
11	10B1WPD731	Entrepreneurship Development
12	10B1WCI733	Graph Algorithms and Applications
13	17B1WHS732	Human Rights for Technocrats
14	10B1WCE732	Hydropower Engineering
15	10B1WBT735	Industrial Plant Tissue Culture
16	10B1WEC731	Mobile Communication
17	15B1WCI731	Mobile Computing
18	10B1WCI735	Network Security and Cryptography Techniques
19	14B1WEC734	Nonlinear and Digital Control Systems
20	10B1WPD734	Principles of Management

IQAC

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

21	17B1WHS731	Quality Management
22	17B1WEC733	Robotic Systems and Control
23	17B1WEC731	Time Frequency Analysis And Its Applications
24	10B13CE736	Underground Technology

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Dean (A&R) Jaypee University of Information Technology Waknaghat

IQAC Jaypee University of Information Technology Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: Dec 5, 2017

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Even Semester 2018).

S. No	Course Code	Course Name
1	17B1WCI833	AI : Knowledge Representation and Reasoning
2	15B1WCI833	Big Data Analytics
3	14B1WBT741	Bio-Resource & Industrial Products
4	12B1WCI831	Cloud Computing
5	15B1WBI834	Computational Molecular Evolution
6	17B1WCI812	Computer Games
7	17B1WCI814	Design and Analysis of Real World Algorithms
8	17B1WCE833	Environmental Protection and Sustainability
9	11B1WBT838	Genetic Counseling
10	15B1WBT839	Infectious Diseases
11	13B1WHS832	International Business Management
12	14B1WHS832	International Human Resource Management
13	13B1WHS834	Internet Marketing
14	15B1WCI832	Internet of Things Architecture And Design (OE)
15	17B1WCI832	Introduction to Internet of Things
16	11B1WMA832	Linear Programming and Applications
17	17B1WCI811	Mobile and Distributed Computing
18	11B1WBT840	Nano Biotechnology
19	11B1WCI836	Network Management
20	11B1WEC834	Optical Communication Systems
21	11B1WCI834	Parallel Processing
22	13B1WCI831	Service Oriented Architecture
23	17B1WHS832	Six Sigma
24	13B1WEC831	Soft Computing Techniques
25	11B1WCI835	Storage Networks
26	11B1WPD832	Strategic Management

IQAC

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

27	17B1WHS831	Understanding India: Literary Reflections
28	15B1WCI831	Wireless Sensor Networks-Protocols And Applications (OE)

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology Waknaghat Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: May 21, 2018

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Odd Semester 2018).

S. No	Course Code	Course Name
1	10B13CE744	Advanced Concrete Technology
2	12B1WCI733	Advanced Java
3	10B13CE742	Air Pollution Monitoring & Control
4	14B1WBT736	Antibody Engineering Technologies
5	13B1WCI731	Arm Based Embedded System Design
6	10B1WCI731	Artificial Intelligence
7	14B1WBT731	Bioenergy And Biofuels
8	18B1WBT731	Biosensors- Principles & Applications
9	13P1WHS232	Brand Management
10	17B1WHS733	Business Analytics
11	12B1WCI734	C# and Vb.Net
12	18B1WBT737	Clinical Trials and Database Management System
13	14B1WBI732	Computational Systems Biology
14	18P1WHS101	Contemporary Issues In Indian Economy
15	18B1WEC732	Design of Dependable Systems
16	12B1WEC732	Digital System Design
17	18B1WEC735	Embedded System Design
18	10B1WPD731	Entrepreneurship Development
19	18B1WBT736	Enzymes In Food Processing

IQAC

Jaypee University of Information Technology
Dean (A&R)
Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

20	10B1WPD737	Financial Planning
21	10B1WCI733	Graph Algorithms And Applications
22	10B1WPD735	Human Resource Management
23	17B1WHS732	Human Rights For Technocrats
24	10B1WCE732	Hydropower Engineering
25	10B1WCI737	Image Processing
26	10B13BT832	Industrial Enzymes
27	10B1WBT735	Industrial Plant Tissue Culture
28	11B1WCI832	Information Retrieval And Data Mining
29	18B1WEC733	Machine Learning And Data Analytics-1
30	18B1WEC734	Medical Image Processing
31	15P1WPH215	Microstrip Antenna Design
32	10B1WEC731	Mobile Communication
33	15B1WCI731	Mobile Computing
34	10B1WCI735	Network Security And Cryptography Techniques
35	18B1WBT732	Peptides & Therapeutics
36	18B1WCI731	Python Programming
37	17B1WHS731	Quality Management
38	17B1WEC733	Robotic Systems And Control
39	13P1WHS137	Service Marketing
40	11B1WCI731	Software Agents
41	14B1WBT739	Stem Cells & Regenerative Medicines
42	18B1WBT735	Stem Cells And Healthcare
43	10B13CE736	Underground Technology

IQAC

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: December 18, 2018

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Even Semester 2019).

S. No	Course Code	Course Name
1	18B11CI313	Database Management Systems
2	18B11BI313	Biological Computation
3	18B11CI313	Database Management Systems - IT
4	15B1WCI833	Big Data Analytics
5	14B1WBT741	Bio-Resource & Industrial Products
6	18B1WCI836	Block Chain Technologies
7	12B1WCI831	Cloud Computing
8	14B1WEC733	Cognitive Radio Networks
9	15B1WBI834	Computational Molecular Evolution
10	18B1WHS831	Contemporary India : Chlngs Of Democ & Dvlopmt
11	18B1WCI831	Deep Learning
12	17B1WCI814	Design And Analysis Of Real World Algorithms
13	10B1WBT737	Environmental Biotechnology
14	18B1WEC834	Fundamentals Of Next Generation Communication System
15	11B1WBT838	Genetic Counseling
16	11B1WCE834	Highway Construction And Maintenance
17	13B1WHS833	Industrial Sociology
18	15B1WBT839	Infectious Diseases
19	11B1WCI832	Information Retrieval And Data Mining
20	13B1WHS832	International Business Management
21	14B1WHS832	International Human Resource Management

Dean (A&R)
Jaypee University of Information Technology Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	13B1WHS834	Internet Marketing
23	15B1WCI832	Internet Of Things Architecture And Design (Oe)
24	11B1WMA832	Linear Programming And Applications
25	18B1WCI832	Machine Learning Algorithms
26	18P1WHS232	Marketing Research
27	13B1WEC832	Modern Antennas
28	18B12BT412	Molecular Ecology
29	11B1WBT840	Nano Biotechnology
30	18B1WCI839	Natural Language Processing Techniques
31	11B1WCI836	Network Management
32	18B1WEC831	Networked Embedded Control Systems
33	11B1WEC834	Optical Communication Systems
34	18P1WHS231	Public Finance
35	18B1WCI842	R Programming And Applications
36	18B1WCI838	Secure Web Application Development
37	13B1WCI831	Service Oriented Architecture
38	13B1WEC831	Soft Computing Techniques
39	11B1WCI835	Storage Networks
40	18B1WEC837	Theory And Applications Of Intelligent Systems
41	17B1WHS831	Understanding India: Literary Reflections

Jaypee University of Information Technology Waknaghat
Dean (A&R)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: May 09, 2019

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Odd Semester 2019).

S. No	Course Code	Course Name
1	10B13CE744	Advanced Concrete Technology
2	12B1WCI733	Advanced Java
3	10B13CE742	Air Pollution Monitoring & Control
4	16B1WEC831	Antenna And Wave Propagation
5	14B1WBT736	Antibody Engineering Technologies
6	18B1WEC533	Applied Artificial Intellegence
7	13B1WCI731	Arm Based Embedded System Design
8	10B1WCI731	Artificial Intelligence
9	14B1WBT731	Bioenergy And Biofuels
10	18B1WBT731	Biosensors- Principles & Applications
11	17B1WHS733	Business Analytics
12	12B1WCI734	C# And Vb.Net
13	14B1WBI732	Computational Systems Biology
14	18B1WCI733	Computational Techniques And Algorithms
15	18B1WEC531	Control Systems
16	10B13CE735	Dam And Reservoir Design
17	18B1WCI532	Data Compression
18	18B1WEC732	Design Of Dependable Systems
19	12B1WEC732	Digital System Design
20	18B1WEC735	Embedded System Design
21	10B1WPD731	Entrepreneurship Development

Jaypee University of Information Technology
Dean (A&R)
Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	10B1WPD737	Financial Planning
23	18B1WEC731	Fpga Based Instrumentation System Design
24	10B1WEC734	Fundamentals Of Digital Image Processing
25	10B1WCI733	Graph Algorithms And Applications
26	10B1WPD735	Human Resource Management
27	17B1WHS732	Human Rights For Technocrats
28	10B1WCI737	Image Processing
29	10B13BT832	Industrial Enzymes
30	18B1WCI531	Information Theory & Coding
31	19B2WBT701	Introduction To Proteogenomics
32	18B1WCI534	Java Programming
33	18B1WEC733	Machine Learning And Data Analytics-1
34	18B1WEC734	Medical Image Processing
35	18B1WEC532	Microwave Components And Devices
36	10B1WEC731	Mobile Communication
37	15B1WCI731	Mobile Computing
38	10B1WCI735	Network Security And Cryptography Techniques
39	18B1WBT732	Peptides & Therapeutics
40	18B1WCI533	Principle Of Programming Languages
41	18B1WCI731	Python Programming
42	18B1WCI535	Python Programming & Applications
43	17B1WHS731	Quality Management
44	18B1WCI732	Social And Information Network Analysis
45	11B1WCI731	Software Agents
46	10B13CE736	Underground Technology
47	18B11BI313	Biological Computation
48	18B11BI512	Scripting Languages for BI

Jaypee University of Information Technology Dean (A&R) Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

49	18B11CI311	Object Oriented Systems and Programming
50	18B11CI313	Database Management Systems
51	18B11CI314	Python Programming Essentials
52	18B11CI315	Python Programming with Raspberry PI
53	18B11EC312	Digital Electronics & Logic Design
54	19B11BI311	Bioinformatics Data Management

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: December 05, 2019

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Even Semester 2020).

S. No	Course Code	Course Name
1	18B1WCI837	Advanced Computer Architecture
2	18B1WEC533	Applied Artificial Intellegence
3	14B1WBT741	Bio-Resource & Industrial Products
4	18B1WCI637	C# And Vb.Net
5	12B1WCI831	Cloud Computing
6	14B1WEC733	Cognitive Radio Networks
7	15B1WBI834	Computational Molecular Evolution
8	18B1WCI840	Computer Vision
9	18B1WHS831	Contemporary India : Chlngs Of Democ & Dvlopmt
10	18B1WEC531	Control Systems
11	18B1WCI631	Data Structure And Software Design
12	18B1WCI831	Deep Learning
13	18B1WCI835	Design & Analysis Of Multidimmensional Data Structures
14	19B1WEC632	Embedded Systems
15	18B1WCI833	Fault Tolerant System Design
16	18B1WEC834	Fundamentals Of Next Generation Communication System
17	11B1WBT838	Genetic Counseling
18	11B1WCE834	Highway Construction And Maintenance
19	15B1WBT839	Infectious Diseases
20	11B1WCI832	Information Retrieval And Data Mining
21	13B1WHS832	International Business Management

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	14B1WHS832	International Human Resource Management
23	13B1WHS834	Internet Marketing
24	15B1WCI832	Internet Of Things Architecture And Design (Oe)
25	18B1WCI634	Machine Learning
26	13B1WEC832	Modern Antennas
27	11B1WBT840	Nano Biotechnology
28	11B1WCI836	Network Management
29	18B1WEC831	Networked Embedded Control Systems
30	19B1WEC631	Neural Networks
31	15B1WBI832	Ngs Data Analysis & Applications
32	11B1WEC834	Optical Communication Systems
33	13B1WEC834	Quantum Effects In Semiconductor Physics
34	13B1WEC831	Soft Computing Techniques
35	18B1WCI834	Software Reliability
36	18B1WCI633	Software Testing Fundamentals
37	17B1WHS831	Understanding India: Literary Reflections
38	15B1WCI831	Wireless Sensor Networks-Protocols And Applications (Oe)
39	18B11BI414	Programming Languages for Bioinformatics
40	18B11BT413	Intorduction to Bioinformatics
41	18B11CI412	Design & Analysis of Algorithms
42	18B11CI415	Object Oriented Programming

Jaypee University of Information Technology
Dean (A&R)
Waknaghat

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Course Duration: 42 hours

- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: June 11, 2020

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Odd Semester 2020).

S. No	Course Code	Course Name
1	18B11CI313	Database Management Systems
2	18B1WCI835	Deep Learning -CSE/IT
3	18B11CI311	Object Oriented Systems and Programming CSE/IT
4	18B11CI315	Python Programming with Raspberry PI
5	18B11CI314	Python Programming Essentials
6	18B11BI512	Scripting Languages for BI
7	18B11CI412	Design & Analysis of Algorithms
8	18B11EC312	Digital Electronics & Logic Design
9	18B11BI313	Biological Computation
10	19B11BI311	Bioinformatics Data Management
11	10B13CE744	Advanced Concrete Technology
12	10B13CE742	Air Pollution Monitoring & Control
13	14B1WBT736	Antibody Engineering Technologies
14	20B1WCI731	Artificial Intelligence
15	14B1WBT731	Bioenergy And Biofuels
16	12B1WCI732	Biometric Recognition Techniques
17	18B1WBT731	Biosensors- Principles & Applications
18	17B1WHS733	Business Analytics
19	20B1WCI532	Cloud Computing: Concepts, Technology & Architecture
20	13B1WEC731	Cmos Analog Circuit Design
21	14B1WEC733	Cognitive Radio Networks

Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	14B1WBI732	Computational Systems Biology
23	18B1WCI734	Cryptography& Network Security
24	10B13CE735	Dam And Reservoir Design
25	18B1WCI532	Data Compression
26	18B1WCI635	Data Mining & Data Warehousing
27	20B1WCE732	Design Of Reinforced Concrete Structures
28	18B1WCI636	Digital Image Processing
29	12B1WEC732	Digital System Design
30	10B1WPD731	Entrepreneurship Development
31	20B1WCI531	Foundation For Data Science And Visualization
32	18B1WEC731	Fpga Based Instrumentation System Design
33	20B1WCI732	From Graph To Knowledge Graph
34	10B1WEC734	Fundamentals Of Digital Image Processing
35	20B1WEC533	Fundamentals Of Digital Image Processing And Applications
36	14B1WEC735	Fundamentals Of Embedded Systems
37	10B1WPD735	Human Resource Management
38	17B1WHS732	Human Rights For Technocrats
39	20B1WEC532	Introduction To Machine Learning
40	18B1WEC733	Machine Learning And Data Analytics-1
41	18B1WEC734	Medical Image Processing
42	20B1WBT734	Microbial Ecology
43	10B1WEC731	Mobile Communication
44	18B1WEC534	Network Analysis And Synthesis
45	18B1WBT732	Peptides & Therapeutics
46	15B1WEC732	Rf And Microwave
47	17B1WEC733	Robotic Systems And Control
48	18B1WCI732	Social And Information Network Analysis

Jaypee University of Information Technology * Waknaghat *
Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT *
IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

49	20B1WEC531	Switching Theory And Logic Design
50	17B1WEC731	Time Frequency Analysis And Its Applications
51	10B13CE736	Underground Technology

Course Duration: 42 hours

- The course will run in online mode using Google Meet via Classroom.
- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology Waknaghat Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: Jan 04, 2021

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Even Semester 2021).

S. No	Course Code	Course Name
1	18B1WBI631	Advanced Algorithms for BioInformatics
2	18B1WBI632	Dataware Housing and Mining for BioInformatics
3	18B11CI612	Compiler Design
4	18B11CI413	Modeling and Simulation Techniques
5	18B11CI411	Operating Systems
6	19B11CI411	Software Engineering Practices
7	18B11CI415	Object Oriented Programming
8	19B11CI411 (IT)	Software Engineering Practices (IT)
9	18B11EC413	Modern Analog and Digital Communication
10	18B11BI612	Computer Aided Drug Design
11	18B11BI611	Machine Learning for BioInformatics
12	18B11BI414	Programming Languages for Bioinformatics
13	18B1WBI631	Advanced Algorithms For Bioinformatics
14	18B1WCE631	Advanced Structural Analysis
15	19B1WCI635	Architecting Distributed Cloud Applications
16	15B1WCI833	Big Data Analytics
17	14B1WBT741	Bio-Resource & Industrial Products
18	18B1WCI836	Block Chain Technologies
19	18B1WHS632	Business Analytics
20	12B1WCI831	Cloud Computing
21	15B1WBI834	Computational Molecular Evolution

Jaypee University of Information Technology ★ Waknaghat ★
Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY ★ WAKNAGHAT ★
IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	19B1WCI633	Computer Animation
23	18B1WCI840	Computer Vision
24	18B1WCE641	Construction Management Computations
25	18B1WHS831	Contemporary India : Chlngs Of Democ & Dvlopmt
26	18B1WCI635	Data Mining & Data Warehousing
27	20B1WEC831	Data Science Using Python
28	18B1WBI632	Dataware Housing And Mining For Bioinformatics
29	19B1WCI631	Digital Forensics
30	18B1WCI636	Digital Image Processing
31	18B1WCI833	Fault Tolerant System Design
32	10B1WPD737	Financial Planning
33	20B1WCI732	From Graph To Knowledge Graph
34	18B1WEC834	Fundamentals Of Next Generation Communication System
35	11B1WBT838	Genetic Counseling
36	11B1WCE834	Highway Construction And Maintenance
37	18B1WHS641	Human Rights For Technocrats
38	11B1WBT833	Industrial Enzymes
39	18B1WBT632	Infectious Diseases
40	19B1WCI632	Information Security
41	13B1WHS832	International Business Management
42	14B1WHS832	International Human Resource Management
43	13B1WHS834	Internet Marketing
44	15B1WCI832	Internet Of Things Architecture And Design (Oe)
45	20P1WHS231	Investment Analysis
46	18B1WCI634	Machine Learning
47	20B1WBT631	Manufacturing Process And Industrial Products

Dean (A&R)
Jaypee University of Information Technology
Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

48	18B1WBT633	Nano-Biotechnology
49	11B1WCI836	Network Management
50	18B1WEC831	Networked Embedded Control Systems
51	15B1WBI832	Ngs Data Analysis & Applications
52	18B1WHS631	Quality Management
53	20B1WHS631	Service Design And Marketing
54	13B1WEC831	Soft Computing Techniques
55	18B1WCI834	Software Reliability
56	18B1WCI633	Software Testing Fundamentals
57	19B1WCI637	Statistics And Exploratory Data Analytics
58	18B1WHS640	Strategic Management
59	18B1WCE634	Transportation Engineering
60	17B1WHS831	Understanding India: Literary Reflections
61	20B1WBI831	Virology

Course Duration: 42 hours

- The course will run in online mode using Google Meet via Classroom.
- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)
Professor and Dean (Academics & Research)
JUIT

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: June 15, 2021

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Odd Semester 2021).

S. No	Course Code	Course Name
1	18B1WCI743	Advanced Algorithms
2	18B11CI511	Advanced Java
3	19B1WCI734	Object Oriented Technologies using Java
4	20B1WCI532	Cloud Computing: Concepts, Technology & Architecture
5	18B11CI514	Computer Organization and Architecture
6	18B11CI513	Formal Language & Automata Theory
7	18B11CI512	Information Systems
8	18B11CI512 (IT)	Information Systems - IT
9	19B1WCI740	An Introduction to Statitstical Learning
10	18B11CI515	Computer Graphics
11	18B11EC312	Digital Electronics & Logic Design
12	18B11EC512	Microprocessor and Interfacing
13	20B11BI311	Bioinformatics Data Management
14	20B1WEC532	Introduction to Machine Learning
15	20B1WEC732	Machine Learning for Wireless Communication
16	18B11BI313	Biological Computation
17	20B1WCI531	Foundation for Data Science and Visualization
18	18B1WCI532	Data Compression
19	18B11CI315	Python Programming with Raspberry PI
20	18B11CI314	Python Programming Essentials
21	18B11CI311	Object Oriented Systems and Programming

Jaypee University of Information Technology * Waknaghat *
Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT *
IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	18B11CI313	Database Management Systems
23	18B11BI511	Design & Analysis of Algorithms
24	21B2WCI531	Operating System Fundamentals
25	18B11BI512	Scripting Languages for BI
26	18B1WCI743	Advanced Algorithms
27	19B1WCI740	An Introduction To Statistical Learning
28	20B1WCI731	Artificial Intelligence
29	20B1WEC735	Artificial Intelligence Techniques For Genomic Signal Proces
30	20B1WEC731	Automation And Robotics
31	20B1WCI532	Cloud Computing: Concepts, Technology & Architecture
32	18B1WBT532	Comparative & Functional Genomics
33	19B1WCI731	Computational Data Analysis
34	18B1WBI731	Computational Systems Biology
35	18B1WCI840	Computer Vision
36	10M11CE111	Construction Techniques
37	18B1WCI734	Cryptography& Network Security
38	18B1WCE736	Dam And Reservoir Design
39	18B1WCI532	Data Compression
40	20B1WEC734	Digital Systems
41	18B1WCE732	Environmental Management And Impact Assessment
42	18B1WCE737	Finite Element Method
43	19B1WBT732	Food Nutrition & Health Care
44	19B1WEC735	Forensic Image Processing
45	20B1WCI531	Foundation For Data Science And Visualization
46	18B1WEC744	Fpga Based Instrumentation System Design
47	18B1WEC536	Fundamentals Of Digital Image Processing

Dean (A&R)
Jaypee University of Information Technology Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

48	20B1WEC533	Fundamentals Of Digital Image Processing And Applications
49	20B1WEC736	Image Sensing And Reconstruction
50	18B1WBT733	Industrial Enzymes Technologies
51	21B1WBT531	Industrial Plant Tissue Culture
52	19B1WCI736	Information Auditing & Risk Management
53	18B1WBT734	Intellectual Property Rights & Commercialization
54	19B1WCI738	Introduction To Deep Learning
55	20B2WCI701	Introduction To Industry 4.0 & Industrial Internet Of Things
56	20B1WEC532	Introduction To Machine Learning
57	20B1WEC732	Machine Learning For Wireless Communications
58	18B1WEC847	Medical Image Processing
59	18B1WPH731	Nanotechnology
60	21B2WCI701	Natural Language Processing
61	18B1WEC745	Next Generation Communication Systems
62	19B1WCI734	Object-Oriented Technologies Using Java
63	19B1WCI774	Object-Oriented Technologies Using Java Lab
64	21B2WCI531	Operating System Fundamentals
65	18B1WPH732	Optical Fiber Network Design
66	19B1WCI737	Optimization Methods In Business Analytics
67	18B1WCE740	Optimization Techniques
68	19B1WEC733	Optimization Techniques
69	19B1WEC732	Pattern Analysis In Machine Intelligence
70	19B1WEC731	Real Time Operating System
71	21B2WCE603	Repair And Maintenance Of Buildings
72	18B1WEC737	Robotic Systems And Control
73	21B2WCI702	Software Engineering

Jaypee University of Information Technology * Waknaghat
Dean (A&R)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

74	14B1WBT739	Stem Cells & Regenerative Medicines
75	18B1WCI736	Storage Networks
76	18B1WBI531	Structural Bioinformatics
77	19B1WBT731	Sustainable Technologies For Waste Management
78	20B1WEC531	Switching Theory And Logic Design

Course Duration: 42 hours

- The course will run in online mode using Google Meet via Classroom.
- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

Date: December 20, 2021

NOTICE

This is to inform you that the following value added courses will be offered to the students in various departments in the ensuing semester (Even Semester 2022).

S. No	Course Code	Course Name
1	13B1WCI731	Arm based Embedded System Design
2	18B11CI612	Compiler Design
3	18B11CI611	Computer Networks
4	18B1WCI843	Data Analytics
5	18B11CI613	Data Mining
6	18B11CI412	Design & Analysis of Algorithms
7	19B1WCI839	Foundations of Blockchain
8	18B1WCI634	Machine Learning
9	18B11CI415	Object Oriented Programming
10	19B1WCI734	Object-Oriented Technologies using Java
11	18B11CI613 (IT)	Data Mining -IT
12	19B1WCI839 (IT)	Foundations of Blockchain- IT
13	18B11EC413	Modern Analog and Digital Communication
14	18B11EC611	Wireless and Data Communication
15	18B11BI612	Computer Aided Drug Design
16	18B11CI413	Modeling and Simulation Techniques
17	18B11CI411	Operating Systems
18	19B1WCI632	Information Security
19	20B1WCI732	From Graph to Knowledge Graph
20	19B11CI411	Software Engineering Practices
21	19B1WCI637	Statistics and Exploratory Data Analytics

Jaypee University of Information Technology * Waknaghat * Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

22	18B11CI211	Data Structure and Algorithms
23	18B11BI611	Machine Learning for BioInformatics
24	19B1WEC636	Machine Learning for Data Analysis
25	18B1WCE831	Advanced Reinforced Concrete Design
26	18B1WCE631	Advanced Structural Analysis
27	21M1WEC233	Applied Machine Learning For Iot
28	19B1WEC836	Applied Medical Signal Processing
29	19B1WCI635	Architecting Distributed Cloud Applications
30	13B1WCI731	Arm Based Embedded System Design
31	18B1WEC838	Artificial Intelligence Techniques
32	18B1WEC841	Bio Electronic Sensors
33	18B1WBT634	Bioenergy & Biofuels
34	21B1WBT832	Bioprocess Modelling And Simulation
35	11M1WCE133	Bridge Engineering
36	18B1WHS632	Business Analytics
37	19B1WEC832	Cad Algorithms For Synthesis Of Digital Systems
38	20M1WBT234	Clinical Diagnostics
39	19B1WCI835	Cloud Computing Security
40	18B1WBI831	Computational Molecular Evolution
41	20MSWBT433	Computational Systems Biology
42	21B1WCE871	Computer Applications In Environmental Engineering Lab
43	19B1WEC633	Computer Vision
44	21B1WCE832	Construction Planning And Control
45	18B1WCI843	Data Analytics
46	18B1WCI635	Data Mining & Data Warehousing
47	18B1WCE735	Design Of Prestressed Concrete Structures
48	18B1WBT833	Diagnostics & Vaccine Manufacture

Dean (A&R)
Jaypee University of Information Technology Waknaghat
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

49	19B1WEC831	Digital Cmos Ics
50	19B1WCI631	Digital Forensics
51	21B1WEC731	Digital Image Processing Using Python
52	20MSWBT432	Drug Discovery And Development
53	19B1WEC635	Embedded System Design
54	20MSWBT232	Environmental Biotechnology
55	19B1WCI831	Ethics And Information Technology
56	21B1WBT831	Food Processing And Engineering
57	19B1WCI839	Foundations Of Blockchain
58	20B1WCI732	From Graph To Knowledge Graph
59	18B1WBT831	Genetic Counselling
60	18B1WHS641	Human Rights For Technocrats
61	21M1WEC231	Image Sensing And Realtime Processing
62	18B1WBT636	Industrial Chemistry
63	18B1WBT632	Infectious Diseases
64	19B1WCI833	Information Modeling
65	19B1WCI632	Information Security
66	18B1WHS634	Internet Marketing
67	14B1WHS833	Investment Analysis & Portfolio Management
68	18B1WCI634	Machine Learning
69	19B1WEC636	Machine Learning For Data Analysis
70	20B1WBT631	Manufacturing Process And Industrial Products
71	20MSWBT231	Nanobiotechnology
72	18B1WBT633	Nano-Biotechnology
73	18B1WBI834	Ngs Data Analysis & Applications
74	19B1WCI734	Object-Oriented Technologies Using Java
75	19B1WCI774	Object-Oriented Technologies Using Java Lab

Jaypee University of Information Technology Waknaghat Dean (A&R)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislature vide Act No. 14 of 2002)
P.O. Waknaghat, Teh. Kandaghat, Distt. Solan - 173234 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. +91-01792-257999 (30 Lines)
Fax : +91-01792-245362

76	18B1WCE639	Open Channel Flow And Hydraulic Machine
77	18B1WEC633	Optical Communication Systems
78	19B1WCI832	Probabilistic Graphical Models
79	20M1WBT231	Qc Analysis And Management
80	18B1WHS631	Quality Management
81	19B1WCI837	Reinforcement Learning
82	19B1WEC837	Remote Sensing And Satellite Image Processing
83	21B1WEC732	Renewable Energy Systems
84	20B1WHS631	Service Design And Marketing
85	21M1WEC236	Smart Internet Of Things
86	18B1WCI732	Social And Information Network Analysis
87	18B1WEC851	Soft Computing Techniques
88	19B1WCI637	Statistics And Exploratory Data Analytics
89	18B1WCE834	Sustainable Development
90	18B1WCE634	Transportation Engineering
91	18B1WHS636	Understanding India: Literary Reflections

Course Duration: 42 hours

- The course will run in online mode using Google Meet via Classroom till the notification of offline classes.
- Classes will be held as per Time-Table, notified at the beginning of the semester.
- It is mandatory for all registered students of respective departments to attend classes.

(Prof. (Dr.) Ashok Kumar Gupta)

Professor and Dean (Academics & Research)

JUIT

Dean (A&R) Jaypee University of Information Technology Waknaghat

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Advanced Concrete Technology

COURSE CODE: 10B13CE744

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Concrete Technology

Course Objectives:

1. To prepare the graduates as best civil engineers with an excellent comprehension of fundamentals of concrete structure at micro and macro levels and applications of different types of cement and concretes.
2. To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.
3. Study and understand the procedure of mix design for production of ultra-high strength concrete by the use of particle packing concepts.
4. To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete
5. To understand the fundamentals of self-compacting concrete and its testing for different properties.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To study the basic fundamentals, classifications and applications of polymer concrete, fiber reinforced concrete.	Familiarity
CO-2	To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.	Assessment
CO-3	Study and Understand the procedure of mix design for production of ultra high strength concrete by the use of particle packing concepts.	Assessment
CO-4	To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete.	Usage
CO-5	To understand the basic fundamentals of self compacting concrete and its testing for different properties.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction to polymer concrete- its classification and applications.	14
2	**Ultra high strength concrete:** basic fundamentals. Types, application and production.	4
3	**Mix design of Polymer concrete and UHPC:** Introduction of particle packing concept, optimization of granular mixture and how to design for a mixture to increase the homogeneity of the mixture.	8
4	**Self compacting concrete:** Mix design, testing, production and application.	4
5	**Mineral and chemical admixtures**: Optimization and selection of a particular type of mineral and chemical admixture.	12
Total lectures		42

Suggested Text Book(s):

1. A.M.Neville, -PropertiesofConcretel,EnglishLanguage BookSociety/LongmanPub, 1988
2. P.K.Mehta and J.M.M.Paulo, —Concrete – Microstructure – Properties and Materiall, ICI, Indian First Edition, Reprint1999.

Suggested Reference Book(s):

1. Zonghjin Li, —Advanced Concrete Technology, John Wiley & Sons, INC, Newjersy,20111.
2. A.R. Santhakumar, —Concrete Technolgyl, Oxford University press, New Delhi,2009.
3. N.Krishna Raju, —Design of Concrete Mixl, CBS Pub.,1985.
4. Taylor, H. W. F., _Cement Chemistry,' Academic Press, Inc., San Diego, CA,1990.
5. Lea, F. M., _The Chemistry of Cement and Concrete,' Chemical Publishing Company, Inc., New York, 1971.
6. Mindess, S., and Young, J. F., _Concrete,' Prentice Hall, Inc., NJ, 1981. J. Newman and B. S. Choo,Eds., _Advanced Concrete Technology', Four Volume Set, Elsevier, 2003

Other useful resource(s):

1. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_ce21/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Civil Engineering

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Advanced Concrete Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	2	1	1	3	1	1	2	2	3	3	**1.92**
CO-2	1	2	3	2	2	1	2	3	3	1	3	2	**2.08**
CO-3	3	3	3	2	1	1	2	3	2	2	3	2	**2.25**
CO-4	3	2	1	3	1	2	3	3	2	3	3	2	**2.33**
CO-5	2	3	3	3	1	3	1	2	2	3	3	2	**2.33**
Average	**2.4**	**2.2**	**2.4**	**2.2**	**1.2**	**2**	**1.8**	**2.4**	**2.2**	**2.2**	**3**	**2.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

12B1WCI733: Advanced JAVA

Course Credit: 3
Semester: VII

Introduction

This course will expose students to the depth and breadth of modern programming practice, with the goal of making students better programmers. This course aims to introduce the students to some concepts of advanced java programming and practice on reusing components. The course covers advanced features of Java such as Applets, Multithreading, Swings, Servlets, Java Server Pages, Java Database Connectivity, Java Bean, Remote Method Invocation, Enterprise Java Beans, Struts and Hibernate.

Course Objectives (Post-conditions)
Knowledge objectives:

1. You will learn the Internet Programming, using Java Applets
2. You will be able to create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
3. You will be able to perform event handling on AWT and Swing components.
4. You will learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
5. You will learn how to create dynamic web pages, using Servlets and JSP.
6. You will learn to make a resusable software component, using Java Bean.
7. You will learn to invoke the remote methods in an application using Remote Method Invocation (RMI)
8. Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
9. You will learn to develop Stateful, Stateless and Entity Beans.
10. To make the students familiar with Struts frameworks, which gives the opportunity to reuse the codes for quick development.
11. Learn to map Java classes and object associations to relational database tables with Hibernate mapping files.

Application objectives:

1. Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications
4. Designing Enterprise based applications by encapsulating an application's business logic.
5. Designing applications using pre-built frameworks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Expected Student Background (Preconditions)

Oriented Programming with proficiency in Core Java

Topics Outline:

Sr No	Topic	Hrs
1	Applet Programming: Structure and Life Cycle of a Java Applet, Graphics, Multithreading and Animation, Abstract Windowing Toolkit, Event Handling, Swings.	8
2	Java Database Connectivity (JDBC): JDBC Product, Types of Drivers, Two-Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface	4
3	Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP.	6
4	Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page	4
5	Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application	3
6	Enterprise Java Beans (EJB): Types of EnterpriseJava beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Seession Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean	8
7	Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example,	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Developing Application with Struts Tiles	
8	Hibernate: Introduction to Hibernate 3.0, Hibernate Architecture, First Hibernate Application.	3
	Total	42

References

1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2. Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media
3. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media
4. Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media
5. Programming Jakarta Struts, 2nd Edition by Chuck Cavaness, Publisher: O'Reilly Media

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Air and Noise Pollution and Control

COURSE CODE: 10B13CE742

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn history of air pollution, definition of air pollution, and source and classification of air pollution.
2. Learn the effects of air pollutants on human health, vegetation and materials and major control devices to control air pollution problems.
3. Learn dispersion phenomenon of air pollutants covering diffusion and advection, meteorological components, stability of atmosphere and corresponding plume shapes.
4. Learn an overview of noise pollution including methods for prevention, control, measures and management of the pollution.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn the air pollution issues and characterize the elements of air pollution.	Familiarity
CO-2	Solve and design complex problems related to dispersion and air quality modeling.	Assessment
CO-3	Apply relevant techniques and methods for control, and prevention of air pollution	Assessment
CO-4	Develop an overview understanding of the strategies, regulations and policies to manage air and noise pollution.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** The earth's atmosphere: structure and composition.	3
2	**Definition and Elements:** Air pollution: definitions: types of pollutants, sources; effect of air pollution on health, environment and materials; air pollution episodes.	5
3	**Meteorology:** Air pollution meteorology: atmospheric circulation patterns, atmospheric stability and vertical mixing, lapse rate and	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

	temperature inversions.	
4	**Dispersion Modelling:** Atmospheric dispersions modelling: atmospheric stability classes, Gaussian model, estimation of downwind concentrations, plume rise, tall stacks, and critical wind speed.	8
5	**Control of Particulate Matters:** Control of particulate Matter: characteristics of particles drag force, impaction, interception and diffusion. Cyclones, Electrostatic precipitators, Fabric filter, Particulate scrubbers, spray-chambers, cyclone spray chambers, orifice and wet-impingement scrubbers, venturi and venture-jet scrubbers.	6
6	**Control of Gaseous Emissions:** Control of gaseous emissions: gas-liquid and gas solid equilibrium, solubility, absorption, and kinetics. Gas absorption: physical and chemical absorption, isotherms, and absorption potentials.	6
7	**Legislation and Regulations:** Air Pollution Control Act, National Environmental Policy Act, Ambient Air Quality Standards.	4
8	**Noise Pollution:** Noise pollution definition, prevention and control measures, management of pollution.	4
Total lectures		42

Suggested Text Book(s):

1. H.S. Peavy, D.R. Row and G. Tchobanoglous, Environmental Engineering, Mc Graw Hill International Edition.
2. Air Pollution, M. N. Rao and H.V.N. Rao, Tata Mc Graw Hill.
3. Wark, K., & Warner, C. F. (1981). Air pollution: its origin and control.

Suggested Reference Book(s):

1. Atmospheric Pollution: History, Science, and Regulation, by Mark Z. Jacobson, Cambridge University Press, Cambridge, 2002.
2. Air Quality, by Thad Godish, 4th Edition, Lewis Publishers, 2003.
3. Atmospheric Chemistry and Physics, by John Seinfeld and Spyros Pandis, John Wiley & Sons, 1997.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105102089/
2. Link to topics related tocourse:https://nptel.ac.in/courses/105104099/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Air and Noise Pollution and Control)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	1	1	1	1	1	2	x	x	x	2	**1.33**
CO-2	2	3	3	3	3	2	x	1	2	1	x	1	**2.1**
CO-3	2	3	3	3	3	2	2	1	2	1	x	1	**2.1**
CO-4	2	1	1	2	1	1	2	2	2	1	1	2	**1.5**
Average	**2**	**2**	**2**	**2.25**	**2**	**1.5**	**1.67**	**1.5**	**2**	**1**	**1**	**1.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Antibody Engineering Technologies

14B1WBT736 **Elective**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Immunology

Course Objectives/Learning Goals:

1. The objective of the course is to offer students insight into the understanding of monoclonal antibody engineering for practical use in medicine and biotechnology.

Course Assessment:

Test - 1	15
Test - 2	25
Test - 3	35
Teacher Assessment (Based on Assignments, Quizzes etc.)	25
Total	100

Course Outcomes:

CO I: The students would have in-depth knowledge of generation of mouse, chimeric, humanized and human monoclonal antibodies and their screening strategies.

CO II: The students would have sound knowledge modification of existing human proteins and antibodies and their therapeutic and diagnostic applications.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Topics covered:

Topic	No. of Lectures
Antibody Structure and Function: Basic structure and fine structure of Ig's including domain structure of antibody, immunoglobin classes and subclass. Immunogenicity, affinity, stability, effector functions, half-life, and tissue penetration and distribution. Genetic Rearrangement of IgSF.	7
Traditional methods for Antibody Productions: Monoclonal antibodies, Hybridoma Technology, Applications of Monoclonal antibodies in therapy and diagnosis, drawbacks and limitations of Monoclonal antibodies.	5
Murine, Chimeric, Humanized and Human Antibodies: Approaches for construction and generation of chimeric and humanized antibody, HAMA and HACA, Generation of fully human monoclonal antibodies – methods and procedures.	4
Selecting and screening recombinant antibody libraries: Recombinant antibody libraries, Expression of antibody in bacteria, Phage display technology for screening antibody libraries, screening and generation of transgenic mice for antibody production.	6
Antibody libraries - Immune Library, Naive library, Synthetic library, Semisynthetic library, high throughput screening of libraries.	3
Regulatory issues for the development of antibody, Patents related to antibodies.	1
Engineered Antibodies for therapy and diagnosis: Antibody fragments, immuno, prodrug and toxin conjugates of antibodies, Antibodies against tumors, cancers and other diseases, prospects and challenges for immuno-conjugates.	8
FDA approved Recombinant antibodies in the clinic: Orthoclone, Rituxan, Zenapax, Humira, CDP571, IDEC-CE9.1. etc	8
Total	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Text books

1. Fathimunisa Begum, "*Monoclonal Antibodies: the hopeful drugs*", Chennai: MJP Publishers, 2008.

Reference books

1. John McCafferty, H. R. Hoogenboom, D. J. Chiswell, "*Antibody Engineering: a practical approach*", Oxford University Press, New Delhi, 2002.
2. Lo, Benny K. C, "*Antibody Engineering: methods and protocols*", Totowa: Humana Press, 2004. ***(e-book)***
3. William J. Harris, John R Adair, "*Antibody Therapeutics*", New York: CRC Press, 1997.
4. Steven J Shire, Wayne Gombotz, James Andya, "*Current Trends in Monoclonal Antibody Development and Manufacturing*", New York: Springer Verlag, Netherlands, 2010.
5. Nature Biotechnology: Volume 23 Number 9 September, 2005.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

S.No	13B1WCI731 ARM based Embedded System Design	Level of Attainment	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	Weightage
1	An Introduction to Processor Design: • The fundamental knowledge needed for the Processor architecture and organization, Abstraction in hardware design. • RISC Architecture. • Design for low power consumption.	Familiarity	H	M	M	L	M	H	H	M	L	H	73%
2	The ARM Architecture: • To study Acorn RISC Machine with Architectural inheritance. • The ARM programmer's model and ARM development tools	Familiarity	H	H	H	L	L	H	H	H	M	H	84%
3	ARM Assembly Language Programming: • Data processing, data transfer and control flow instructions. • To write simple assembly language programs.	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
4	ARM Organization and Implementation: • 3-stage and 5-stage pipeline ARM organization. • ARM instruction execution and implementation. • The ARM coprocessor interface.	Technical skills	H	H	H	M	M	M	H	M	M	M	80%
5	The ARM Instruction Set: • To study the complete instruction set of ARM architecture.	Technical skills	H	H	H	M	M	M	M	M	L	H	73%
6	Architectural Support for High-Level Languages: • Abstraction in software design, Data types, Floating-point data types. • The ARM floating-point architecture • Expressions, Conditional statements, Loops, Functions and procedures and use of memory.	Technical skills	H	H	H	H	M	H	H	M	M	H	92%
7	The Thumb Instruction Set: • To understand the Thumb programmer's model. • To have fundamental knowledge of the Thumb software interrupt, data processing, single register data transfer, multiple register data transfer and breakpoint instructions. • Thumb implementation and applications	Assessment	H	H	H	H	M	H	H	M	M	M	88%

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

8	Architectural Support for System Development: • To understand The ARM memory interface 208 • The Advanced Microcontroller Bus Architecture (AMBA) • Understanding the basics of The ARMulator • The ARM debug architecture	Assessment	H	H	H	M	M	H	H	H	M	H	92%
9	ARM Processor Cores: To have fundamental knowledge of the cores: • ARM7TDMI • ARM8 • ARM9TDMI • ARM10TDMI	Assessment	H	H	H	H	M	H	H	H	M	M	85%
10	Memory Hierarchy: • On-chip memory, its size and speed. • To understand basics of Caches and Cache design • Memory management	Technical skills	H	H	H	M	M	M	H	M	M	M	80%
11	Architectural Support for Operating Systems: • Introduction to concept of the ARM system control coprocessor • Synchronization • Context switching	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
12	ARM CPU cores: • Fundamental knowledge of ARM710T, ARM720T and ARM740T ARM CPU cores	Assessment	H	H	H	H	M	H	H	M	M	M	88%
13	Embedded ARM Applications: • Understanding The VLSI Ruby II Advanced Communication Processor • The OneC VWS22100 GSM chip 352 • The Ericsson-VLSI Bluetooth Baseband Controller.	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
	TOTAL		100%	98%	98%	64%	64%	92%	90%	82%	61%	80%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

List of Programme Outcomes (PO) for CSE

PO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

PO-2: An ability to apply knowledge of mathematics, science, and engineering to real-life problems.

PO-3: Ability to model, understand, and develop complex software and information management systems.

PO-4: An ability to function effectively within teams.

PO-5: An understanding of professional and ethical responsibility.

PO-6: An ability to communicate effectively, both in writing and oral.

PO-7: The broad education necessary to understand the impact of Computer Science and Engineering solutions in the societal and human context.

PO-8: A recognition of the need for, and an ability to engage in life-long learning.

PO-9: A knowledge of contemporary issues.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
IQAC

List of POs for IT

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals;

PO-2: Acquire in-depth technical competence in a specific Information Technology discipline;

PO-3: Ability to undertake problem identification, formulation and solution;

PO-4: Ability to utilize systems approach to design and evaluate operational performance;

PO-5: Understanding of the principles of design for sustainable development;

PO-6: Understanding of professional and ethical responsibilities and commitment to them;

PO-7: Ability to communicate effectively, not only with engineers but also with the community at large

PO-8: Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;

PO-9: Understanding of the social, cultural, global and environmental responsibilities of a professional engineer;

PO-10: Recognizing the need to undertake life-long learning, and possessing/acquiring the capacity to do so.

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	Bioenergy and Biofuels	
14B1WBT731		**Elective Course**
		Credits: 3
		L 3 T 0 P 0

Pre-requisites: None

Course Objectives (Learning Goal):

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economical issues related to first, second and third generation biofuels along with Physico chemical techniques

.

Course Assessment:

T1	15
T2	25
T3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes: After the course the students will be able to

CO I: Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels

CO II: Technical barriers in Bioenergy and Biofuel Technology

CO III: Whole biorefinery approaches for economical implementation into the market.

CO IV: Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Topics covered:

Introduction to Biofuels and Bioenergy: Definition, Global Energy Outlook, Sustainability, **Biomass** Feedstocks, Processes and Technologies, Environment and Ecology

Crop Oils, Biodiesel, and Algae Fuels; Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel

Ethanol from Corn and Lignocellulosics: Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-to-Ethanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction

Fast Pyrolysis and Gasification of Biomass: Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas

Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock: Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock

Text Books:

Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press

Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers .

Reference material

Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels	H	H	H	H	H	H	H	100
CO-II	Technical barriers in Bioenergy and Biofuel Technology	H	H	H	M	H	H	M	90.47
CO-III	Whole biorefinery approaches for economical implementation into the market	H	H	H	H	H	H	M	95.23
CO-IV	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy	H	H	H	H	H	H	H	100
	Assessment (%)	100	100	100	91.66	100	100	83.33	

1. Low
2. Medium
3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

	Bioenergy and Biofuels	
14B1WBT731		**Elective Course**
		Credits: 3
		L 3 T 0 P 0

Pre-requisites: None

Course Objectives (Learning Goal):

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economical issues related to first, second and third generation biofuels along with Physico chemical techniques

.

Course Assessment:

T1	15
T2	25
T3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes: After the course the students will be able to

CO I: Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels

CO II: Technical barriers in Bioenergy and Biofuel Technology

CO III: Whole biorefinery approaches for economical implementation into the market.

CO IV: Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topics covered:

Introduction to Biofuels and Bioenergy: Definition, Global Energy Outlook, Sustainability, **Biomass** Feedstocks, Processes and Technologies, Environment and Ecology

Crop Oils, Biodiesel, and Algae Fuels; Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel

Ethanol from Corn and Lignocellulosics: Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-to-Ethanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction

Fast Pyrolysis and Gasification of Biomass: Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas

Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock: Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock

Text Books:
Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press

Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers .

Reference material
Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels	H	H	H	H	H	H	H	100
CO-II	Technical barriers in Bioenergy and Biofuel Technology	H	H	H	M	H	H	M	90.47
CO-III	Whole biorefinery approaches for economical implementation into the market	H	H	H	H	H	H	M	95.23
CO-IV	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy	H	H	H	H	H	H	H	100
	Assessment (%)	100	100	100	91.66	100	100	83.33	

1. Low
2. Medium
3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Jaypee University of Information Technology, Waknaghat

COURSE DESCRIPTION

Course Name:	C# and VB.Net
Course Code:	12B1WCI734
Course Credits:	3 (3-0-0)
Semester:	VII th Semester
Session:	Jun-Dec, 2017
Last updated on:	07-07-2017
Faculty Coordinators:	Sh. Arvind Kumar

Introduction

The design and analysis of algorithms is the core subject matter of Computer Science. Given a problem, we want to (a) find an algorithm to solve the problem, (b) prove that the algorithm solves the problem correctly, (c) prove that we cannot solve the problem any faster, and (d) implement the algorithm. Designing an algorithm for a computational problem involves knowledge of the problem domain, a thorough knowledge of the data structures that are available and suitable and no small measure of creativity. This course concentrates on the above problems, studying useful algorithmic design techniques, and methods for analyzing algorithms.

Course Objectives

The learning objectives of this course are:

- Able to work on objects, namespaces in .NET
- Able to use XML in VB.NET
- Data access with ADO.NET
- Message Queuing
- Web Services
- Remote Objects , clients and Servers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Outcome (CO)

S.NO	Course outcomes (Theory of Computation) (10B11CI513)	Level of Attainment
CO-1	Learn about MS.NET framework developed by Microsoft.	Familiarity
CO-2	You will be able to using XML in C#.NET specifically ADO.NET and SQL server	Usage
CO-3	Be able to understand use of C# basics, Objects and Types, Inheritance	Assessment
CO-4	To develop, implement and creating Applications with C#.	Assessment
CO-5	To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web	Assessment
CO-6	To understand and be able to explain Security in the .NET framework and Deployment in the .NET.	Usage
CO-7	To develop Assemblies and Deployment in .NET, Mobile Application Development.	Assessment

Detailed Syllabus

Fundamental programming concepts are presented together with supporting theoretical foundations and practical applications. This course emphasizes the practical application of techniques for writing and analyzing programs: data abstraction, program verification, and performance analysis. These techniques are applied in the design and analysis of fundamental algorithms and data structures.

Application objectives

1. To understand the security in the .NET framework and Deployment in the .NET.
2. To develop Assemblies and Deployment in .NET, Mobile Application Development.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Expected Student Background (Preconditions)

Graduate level courses in algorithms and complexity of algorithms, compiler design are desirable.

Course Contents/Lecture Plan

S.No	Topics	Hrs
1.	What is Microsoft .NET How it changes application development.	2
2.	Introduction VB.NET and VS.NET Features of VB.NET and VS.NET	2
3.	The Common Language Runtime CLR. Versioning and deployment, memory management, cross language integration, metadata and the IL Disassembler.	2
4.	Variables and Data Types	2
5.	Object Syntax Introduction Define Objects,classes,instances,encapsulation,abstraction,polymorphism,and Inheritance	2
6.	Objects and Components , Namespaces , Error Handling	2
7.	Using XML in VB.NET specifically ADO.NET and SQL server	2
8.	Data Access with ADO.NET object model in order to be able to build flexible, fast and scalable data access objects and applications.	2
9.	Windows forms - This chapter concentrating primarily on forms and built in controls.	2
10.	Creating windows controls- This chapter looks at creating our own windows controls .How to inherit from another control, build a composite control and write control from scratch based on the control class.	2
11.	Web Forms - This chapter explores Web forms and how you can benefit from their use. How .Net provides the power of Rapid Application Development for the development of web applications.	2
12.	Data Binding, Working with classic COM and Interfaces	2
13.	Component Services, Threading , Remoting, Windows services, web services,VB.NET and the internet	2
14.	Security in the .NET framework and Deployment in the .NET	2
15.	Assemblies and Deployment in .NET, Mobile Application Development, Visual Basic Compatibility Library	2
16.	C# basics ,Objects and Types , Inheritance	2
17.	Operators and Casts , Delegates and Events	2
18.	Memory Management and Pointers	2
19.	Strings and Regular Expressions , Collections and Generics	2
20.	Reflection, Errors and Exceptions,Threading,Assemblies,.NET Security	2
21.	Localization, Deployment and Manipulating XML, Working with active directory	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

22.	Windows Applications , Viewing .NET data	2
23.	Web Services, Enterprise Services, Message Queuing, Future of distributed Programming, Interop	2

Evaluation Scheme

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (5 Marks) - 3 (Best 2 considered) Quizzes (5 Marks) - 1 Attendance - 5 Marks

Reference Resources

1. Harsh Bhasin, Programming in C#, Oxford University Press, 2014.

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Theory of Computation)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Weightage
CO-1	H	M	M	L	M	H	M	H	M	M	H	M	73%
CO-2	H	H	H	M	L	M	M	H	M	M	H	M	73%
CO-3	H	H	H	L	M	M	M	H	M	M	H	M	73%
CO-4	H	H	H	H	M	M	M	H	M	M	H	M	75%
CO-5	H	H	H	H	M	H	M	H	H	M	H	H	78%
CO-6	H	M	H	H	H	M	H	H	H	H	H	H	79%

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-7	H	H	H	H	M	M	M	H	M	M	H	M	75%
Weightage	100%	96%	96%	73%	67%	83%	93%	83%	56%	93%	83%	56%	

List of Programme Outcomes (PO)

Graduate Attributes/Program Outcomes	
PO-1	Apply knowledge of mathematics, science and algorithm in solving complex Computer engineering problems.
PO-2	Generate solutions by conducting experiments and applying techniques to analyze and interpret data
PO-3	Design component, or processes to meet the needs within realistic constraints.
PO-4	Identify, formulate, and solve Algorithms problems.
PO-5	Comprehend professional and ethical responsibility in computing profession.
PO-6	Express effective communication skills.
PO-7	Participate in global, economic, environmental, and societal context.
PO-8	Recognize the need for, and an ability to engage in life-long learning.
PO-9	Knowledge of contemporary issues and emerging developments in computing profession.
PO-10	Utilize the techniques, skills and modern computer Engineering tools, Software and techniques necessary for Engineering practice.
PO-11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO-12	Design research problems and conduct research in computing environment.

C# and VB.Net

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme SpecificOutcomes (PSOs)

Attainment of PSOs through COs					
Sr No	PSO-1	PSO-2	PSO-3	PSO-4	Weightage
CO-1	M	H	H	L	72%
CO-2	M	M	M	M	70%
CO-3	H	H	H	H	80%
CO-4	H	H	H	H	80%
CO-5	H	H	H	H	80%
CO-6	M	M	L	L	65%
CO-7	M	M	M	M	70%
Weightage	74%	76%	74%	70%	

List of Programme Specific Outcomes (PSOs)

Program Specific Outcomes	
PSO-1	Detailed Knowledge of contemporary issues in CSE.
PSO-2	Strong skills in learning new programming environments.
PSO-3	Ability to analyse, design, model, develop , test and manage complex software and information management systems.
PSO-4	Ability to analyse, design, model, develop , test and manage complex software and information management systems.

C# and VB.Net

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Cognitive Radio Networks

(Elective Subject)

Course Code:	14B1WEC733	Semester:	7th Sem. B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course objectives

1. To understand the spectrum scarcity problem and how cognitive radio deals with this problem.
2. The contribution of cognitive radio systems in wireless networks and its architectures that enable the development of the cognitive radio network (both centralized and distributed).
3. Technologies to allow an efficient use of TVWS for radio communications.
4. Discussion about various cognitive radio standards.
5. Understanding the various research challenges for deployment of cognitive radio network.
6. Update about current research scenario in this field

Course outcomes

Upon successful completion of this course the students will have developed following skills/abilities

1. Fundamental issues regarding dynamic spectrum access and radio-resource management.
2. Emerging issues in cognitive radio network.
3. Different spectrum sharing models.
4. Efficient sharing of the unutilized spectrum among cognitive and licensed users.
5. Interference avoidance at licensed user due to cognitive user's transmission.

Unit	Topics	Lectures
1.	**Introduction to Cognitive Radio:** Spectrum scarcity, Spectrum white space, Fixed spectrum allocation, Software defined radio (SDR), Limitations of SDR, Evolution of cognitive radio, Dynamic spectrum access, Introduction to cognitive radio concept, Cognitive cycle, Functions of cognitive radio; spectrum sensing, spectrum management, spectrum mobility, Cognitive radio architecture, Interference temperature and its models.	8
2.	**Spectrum Sensing and challenges in cognitive radio network:** Hypothesis model for spectrum sensing, Types of spectrum sensing; Non-cooperative sensing, Cooperative sensing, Interference-based sensing, Matched filter detection, Energy detection, Cyclostationary feature detection, advantages and disadvantages of various spectrum	11

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	sensing techniques, False alarm, Miss detection, Optimal sensing framework for infrastructure based cognitive radio network. Research challenges in spectrum sensing, spectrum management and spectrum mobility, potential applications of cognitive radio, IEEE 802.22 for WRANs.	
3.	**Spectrum sharing and management:** Dynamic spectrum Access (DSA): models and architectures, Opportunistic spectrum access (OSA), Antenna Systems, MIMO systems, Smart antenna and beamforming. SDR architecture, Software tunable analog radio components, Reconfigurable digital radio technologies.	8
4.	**Cross layer adaptation and security in cognitive radio:** Why we need cross-layer design, adaptation and optimization, Cognitive radio cross layer design, security challenges in cognitive radio. **OFDM for cognitive radio:** OFDM based cognitive radio, Why OFDM is a good fit for Cognitive radio, Challenges to cognitive OFDM systems, Multiband OFDM, A step toward cognitive-OFDM: standards and technologies.	9
5.	**Cognitive radio regulation and standardization:** regulatory issues and new spectrum management regimes, spectrum planning, Spectrum authorization, Standards and international activities. **UWB cognitive radio:** Introduction, Fundamentals of impulse radio Ultra Wideband, Cognitive radio requirements versus IR-UWB, Merging impulse radio with cognitive radio.	6
	Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Recommended Reading

1.	Dynamic Spectrum Access and Spectrum Management in Cognitive Radio Networks, Ekram Hossain, Dusit Niyato, and Zhu Han, Cambridge University Press, 2009.
2.	Cognitive Radio Networks, Yang Xiao and Fei Hu, CRC Press.
3.	Cognitive Radio Technology, Bruce Fette, Elsevier, 2006.
4.	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Huseyin Arslan, Springer, 2007.
5.	Essentials of Cognitive Radio, Linda E. Doyle, Cambridge University Press, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Systems Biology

14B1WBI732 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology and various kind of biological pathways, graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop system level understanding of biological entities for various kind of pathways.

Course Assessment:

T-1 Test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation

CO II: Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering

CO III: Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems

Topics covered:

Introduction to Systems biology and computational systems biology, basic principles of components and systems. top down and bottom up approaches, reductionist and integrative approaches for dealing with biological systems. Gene regulatory network (GRN) analysis, genes, operons, regulons, stimulons. Symbols on gene networks and pathways and their relation with

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

the involved entities. Experimental and computational methods available for GRN. Signal transduction pathways and metabolic pathways, Modeling Complex Biological Systems, and Mass/Flux Balance Analysis. Stoichiometry analysis for component and systems level along with their applications. XML for Bioinformatics and systems biology, includes BioXML, SBML, CellML and their practical applications towards modeling and simulations of biological systems. Incorporation of MathML and CML into standard markup languages for systems biology. Systems Approach to Metabolic Networks and Protien-Protein Interaction Networks, Online tools, databases, and other web based applications for Systems Biology: STRING, BIND, MINT, IPATH, GeneGo, Gypasi, MetaCYC, EcoCyc, RegulonDB, AtPID, JASPAR, TFDB etc. Biocircuits: Blocks and Designing; Various case studies along with their applications E-Cell, virtual cell and other bio-electronic projects.

Text and Reference books

1. Systems Modeling in Cellular Biology
   by Zoltan Szallasi, Joerg Stelling, Vipul Periwal, MIT Press,
2. Systems Biology : Properties of Reconstructed Networks
   by Bernard Palsson, Cambridge Univ. Press
3. Advances in Systems Biology (Advances in Experimental Medicine and Biology).
   Opresko, L., Gephart, J., and Mann, M. (eds.), Plenum US, 2005
4. Artificial Intelligence Methods and Tools For Systems Biology
   Dubitzky, W. and Azuaje, F. (eds.), Kluwer Academic Publisher
5. Metabolome Analyses: Strategies for Systems Biology
   Vaidyanathan, S. et al (eds.), Springer-Verlag
6. Systems Biology in Practice: Concepts, Implementation And Application
   Klipp, E et al., John Wiley & Sons Inc.
7. Foundations of Systems Biology
   Kitano, H.(ed.); The MIT Press
8. Systems Biology
   Alberghina L. and Westerhoff, H.V., eds.; Springer Verlag

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation	H	H	H	H	H	H	M	95
CO-II	Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering	M	H	H	H	H	H	M	90
CO-III	Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems	H	H	H	M	H	H	H	95
	Assessment (%)	**89**	**100**	**100**	**89**	**100**	**100**	**78**	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

10B1WPD731 Entrepreneurship Development

Course Goal

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Course Objectives

After the completion of the course, the students:

- Have the ability to discern distinct entrepreneurial traits
- Know the parameters to assess opportunities and constraints for new business ideas
- Understand the systematic process to select and screen a business idea
- discern the factors that can deem the idea successful and viable
- write a business plan

Detailed Syllabi
Lecture-wise Breakup

Subject Code	10B1WPD731	**Semester**	7
Subject Name	**Entrepreneurship Development**		
Credits	3	**Contact Hours**	42

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction to Entrepreneurship	Role of the entrepreneur in India and around the globe; forces that are driving the growth of entrepreneurship; benefits and drawbacks of entrepreneurship; mistakes of entrepreneurship and how to avoid them; entrepreneurial failure.	5
2.	Overview of business and its functioning	Business and industry; Components of macro and micro business environment	4
3.	Business Idea and Feasibility	Creativity, innovation and entrepreneurship; mental locks" that limit individual creativity; steps in the creative process; techniques for improving the creative process; protection of intellectual property involving patents, trademarks, and copyrights.	4

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	**Strategic Management and Entrepreneur**	Importance of strategic management to a (small) business; understanding competitive advantages; steps in the strategic planning process; basic strategies: low-cost, differentiation, and focus; balanced scorecard in the planning process.	4
5.	**Forms of Business Ownership**	Advantages and the disadvantages of the three major forms of ownership: the sole proprietorship, the partnership, and the corporation. LLP and types of franchising: trade name, product distribution, and pure. Major trends shaping franchising.	4
6.	**Building the business plan :marketing considerations**	Marketing concept and evolution; marketing process; guerilla marketing	4
7.	**Foundations of New Venture Finance**	Understanding capital requirements; identifying the sources of finance; angel investing and venture finance; managing cash flow	5
8.	**Creating the Organization : structure and design**	Forms of organization structure; factors contingent on organizational structure and design	4
9.	**Technical entrepreneur and The E-entrepreneur**	Process of creating and growing high potential ventures; basic approaches to launch an e-commerce effort	4
10.	**Crafting a winning business plan**	Need and importance of business plan; elements of a solid business plan.	4
		Total number of Lectures	42

Recommended Reading	
1.	**Entrepreneurship and New Venture Formation**: Thomas W. Zimmerer, and Norman M. Scarborough. PHI
2.	**Entrepreneurship: Strategies and Resources**, 3/E -: Marc Dollinger; Prentice Hall
3.	**Bringing New Technology to Market**- Kathleen R. Allen, Prentice Hall

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	**Entrepreneurship in Action**, 2/E - Mary Coulter; Prentice Hall

Methodology & Evaluation	
The course essentially follows an interactive teaching- learning mode; classroom discussions on core concepts, open-forum discussions, use of multi-media cases and guest speakers.	
Evaluation	
T1	15 marks
T2	25 marks
T3	35 marks
TA	25 marks 1. Entrepreneurial solution to present day social problems 2. Video case 3. Spot exercise : Exercise based on segmentation and strategies 4. Group presentation -1 5. Group presentation -2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology

Department of Computer Science and Engineering

B.Tech (CSE& IT) Semester VII

Course Information:

Course Title:	Graph Algorithms and Applications
Course Code:	10B1WCI733
Credits:	Three (3)
Instructor:	Ravindara Bhatt
Office:	1st Floor, Vivekananda Bhawan
Telephone:	01792-239335

Course Contents: As in the handbook

Examination System:

Term Tests:	75%	(T1: 15%; T2: 25%; T3: 35%)
Internal Assessment:	25%	(Assignment -12,Quizzes -9,Class participation -4)

References:

1. Deo, N., Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall, 1974.
2. Douglas B. West, Introduction to Graph Theory, PHI, second edition, 2001.
3. Cormen, T., Leiserson, C.,Rivest, R. and Stein, C., Introduction to Algorithms., MIT Press, 2001.
4. Gibbons, A., Algorithmic Graph Theory, Cambridge University Press, 1985.
5. Aho, A., Hopcroft, J. and Ullman, J., The Design and Analysis of Computer Algorithms, Addison-Wesley, 1974.
6. Rosen. K, Discrete Mathematics and its Applications, McGraw-Hill, 2007.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Human Rights for Technocrats

Course code: 17B1WHS732

Course Goal

Governments' commitment to human rights is only as strong as society's demands for their rights Scientists, Engineers and health professionals can apply their skills and expertise to human rights issues. Technically rigorous and independent analysis adds credibility to human rights demands.

Course Objective

The training of engineers must therefore prepare them for these scenarios.

In this students will:

- develop an understanding of what human rights are
- understand the origins of modern human rights
- appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
- appreciate the relationship between rights and responsibilities
- understand the forms human rights can take, legally and morally
- analyze the relationship of human rights to daily life
- apply the concepts of human rights to their own lives.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	17B1WHS732	**Semester**	8
Subject Name	**Human Rights for Technocrats**		
Credits	3	**Contact Hours**	3
Faculty (Names)	**Coordinator(s)**	1.Dr. Neena Jindal	
	Teacher(s) (Alphabetically)		

Module No.	Subtitle of the Module	Topics	No. of Lectures

Unit	Contents	Topic	Hrs

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1	Conceptual background of human rights and duties	• Definitions and classifications	2+1
2	Meaning and Significance of Human Rights	• Scope of the Human Rights	2+1
3	Relationship between Rights and Duties	• Constitutional provisions, Fundamental rights • Directive Principles of state policy, • Duties of individuals • Fundamental duties	3+1
4	Universal Declaration of Human Rights: Technical background	• Creation and drafting, Adoption • Significance of the UDHR And its legal effect	2+1
5	History of human rights civilization	• Brief history of human Rights, • The Spread of Human Rights, • Middle Ages, • Modern human rights	2+2
6	Human rights movements	• Anti-colonialism, • World War II and the United Nations, • Global human rights struggles, • Changes in the 1970s, • Since the 1990s	3+3
7	Enforcement and protection mechanism of human rights in India	• Judiciary • National Human Rights Commission and other Commissions and Committees • Non-governmental organizations • Information Media • Education	3+1
8	Development, international trade and human rights	• Right to development: Issues of international equity and justice, equitable access to benefits of science and technology • Freedom of international trade, most-favoured nation treatment (equality of treatment) versus	3+1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		special treatment of the developing countries, access to international markets, equitable pricing of raw materials	
9	Human rights, science and technology	• Overview, • violation of human rights by technology	3+1
10	Human rights of the working class	• Labour welfare legislation in India • Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	4+3
		Total Hours	**42**

Methodology
The course will be taught with the aid of lectures and case studies. Lectures are combined with hands-on practice and discussion in class. . The students will be provided with research papers which they will analyze and study to further strengthen their understanding of the topics. Students need to read in advance case studies in order to be able to answer the questions. Groupwork outside the classroom is also needed for the students to formulate a strategy for an assigned company. Presentation will be given on the current topics related to human rights.
Evaluation Scheme

Exam	**Marks**
Test 1	15
Test 2	25
Test 3	35
Case study\Assignment\Presentations	20
Attendance	5

Note: Group will consist of 3 students. For each class 2 presentations will be scheduled.

Recommended topics for presentations	
1.	Internet and human rights
2.	Corporations and human rights
3.	The Rights of Non-Citizens
4.	The state, censorship and human rights
5.	Counter-terrorism and human rights
6.	Violence against women and human rights

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2.	Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Course outcomes(CO's)and Programme Outcomes(PO's)

Course outcomes (Human Rights for Technocrats)	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**Average**
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75
CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Hydropower Engineering

COURSE CODE: 10B1WCE732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Fluid Mechanics

Course Objectives:

1. To get familiar with the various types of hydro powerplants
2. To impart the knowledge of design of different hydraulic components of HPplant
3. To gain Knowledge about different types of steps involved in planning of water resourceproject

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Knowledge of Various types of HP plants, turbines and its selection criteria.	Assessment
CO-2	Principles and design of various types of hydraulic structures required in HP Scheme.	Assessment
CO-3	Understanding of Economics of Power Generation.	Assessment
CO-4	They will develop understanding of special features of mini, micro hydel plants.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: purpose served by HP projects, Functional requirements in multiple purpose projects, compatibility, steps involved in planning of water resource project, financial analysis of a project, site investigations, Hydrological investigations, assessment of Hydropower potential, water availability, installedcapacity determination.	8
2	**Principles of hydropower development:** Application, advantage and disadvantages of schemes, classification of hydropower schemes and their layouts, Principal components of Hydro-electric scheme	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

3	**Hydraulic turbines:** Classification and selection of turbines, governing of turbines	7
4	**Design of civil works**: Diversion structures, water conductor systems, desilting tanks, cross drainage structures, forebay, Surge tanks and hydraulic transients, Penstocks and pressure shafts, Intakes, penstock, powerhouse, and tailrace.	5
5	**Economics of Power Generation:** Terms and definitions, cost analysis, combined operation of different power plants, Operation of power plants for peaking and base load, principles of power plant design, location of power plant, economics in plant selection, factor affecting economics of generation and distribution of power Tariff for electrical energy.	8
6	**Mini, micro, hydel plants**: Special features of mini, micro hydel plants, civil works of medium and high for mini, micro, hydel plants, different types of turbines	7
Total lectures		**42**

Suggested Text Book(s):

1. Rajput RKText Book of Power Plant Engineering, Laxmi Publications Pvt. Ltd.,2007.
2. Modi, P.N. and Seth, S.M., Hydraulic and Fluid Machines, Standard book house New Delhi,1995.
3. Dandekar, M. M. and Sharma, K. N.: water power Engineering, Vikas Publishing House,2005.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105105110/35-37

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Hydropower Engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	3	3	3	1	1	2	3	**2.25**
CO-2	3	3	3	3	2	3	3	3	2	1	3	3	**2.67**
CO-3	3	3	3	3	2	2	2	2	2	2	3	3	**2.5**
CO-4	3	3	3	3	3	2	2	2	2	3	2	3	**2.58**
Average	**3**	**2.75**	**2.75**	**2.75**	**2.25**	**2.5**	**2.5**	**2.5**	**1.75**	**1.75**	**2.5**	**3**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT • H.P.
IQAC

COURSE TITLE: Industrial Plant Tissue Culture **Credits :3**

COURSE CODE: 10B1WBT725 **Lectures :3/week**

COURSE COORDINATOR: Dr Hemant Sood

Objective:

To provide an insight to the students on different aspects of Plant tissue culture technologies their applications and commercialization for providing beneficiaries.

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	20
Attendance	5
Total	100

Course Outcomes:

CO1. To enable students for applying the knowledge about basic techniques of plant tissue culture.

CO2. To apply the learnt techniques for solving constraints linked with Plant product and technologies

CO3. They will learn the strategies for analyzing, upscaling and commercialization of plant based products.

CO4. To enable students for exploring their avenues for entrepreneurship and social welfare

CO5 . To apply knowledge for developing skills for benefit generation and utilization of techniques of PTC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course content

Topics	Lecture hrs.
Introduction of plant tissue culture and different commercial set ups	2
Different techniques like organ culture, somatic embryos, haploids , callus and suspension cultures	8
Commercially important products generated through plant cell and tissue cultures	3
Development of Transgenics and concerns	4
Secondary metabolites, classifications and utilities	5
Plant stem cells , their maintenance and products	4
Hydrophonics	2
Bioreactors and downstreaming of plant products	3
Automation and robotics ,Extr terrestrial plants	3
Production of flavanoids through cell culture	3
Production of terpenoids and their pathways	3
Role of metabolic engineering and high throughput techniques for the advancements	3

Assignemnts on topics:

Each student should submit assignment in the form of soft copy and ppt on any of the topic

1. Research paper analysis on any topic linked with plant tissue culture and plant biotechnology as per the format announce in the class

or

2. Study of any Plant tissue culture unit national or international working successfully
3. IPTC and its role in economic improvement
4. Case studies on any successful set up of IPTC in Pvt. Or Govt
5. Concerns for transgenics: Boom or doom
6. Any business idea for setting unit for commercialization of plant tissue culture as an entrepreneur

Quizes:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

There will be two quiz tests conducted each of 10 marks which contain MCQ, fill in the blanks and one word answer.

1. In the last week of September
2. In the Last week of November

T3 assignment:

Mention about the usage ,working and principle of one high through put or advance equipment used in IPTC like Sequencer, GS chromatography, Biolistic advance machine, robotic usage etc. 10marks

Reading and reference books:

Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application (Principles and Practice) by: Karl-Hermann Neumann publisher: Springer

Plant cell and tissue culture for the production of food ingredients By Tong-Jen Fu, Gurmeet Singh, Wayne R. Curtis, American Chemical Society

Tissue Culture for Plant Propagators by R.A. de Fossard

Application of Plant Cell and Tissue Culture to Agriculture and Industry by D.T. Tomes, B.E. Ellis, P.M. Harney,K.J. Kasha and R.L. Peterson

Plant Culture Media, Volume 1,Formulations and Uses

by E.F. George, D.J.M. Puttock and H.J.George

Plant Culture Media, Volume 2,Commentary and Analysis

by E.F. George, D.J.M. Puttock and H.J.George

Micropropagation: Technology and Application by P.C. Debergh and R.H. Zimmerman Kluwer Academic Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

MOBILE COMMUNICATION

(Elective Subject)

Course Code:	10B1WEC731	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course Objectives

1. To make students familier with fundamentals of mobile communication systems
2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems
5. As a prerequisite for the course in Wireless LANs

Course Outcomes

1. To make students familiar with various generations of mobile communications
2. To understand the concept of cellular communication
3. To understand the basics of wireless communication
4. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
5. Knowledge of IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
6. Knowledge of 3G mobile standards and their comparison with 2G technologies.
7. To under multicarrier communication systems.
8. To differentiate various Wireless LANs.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Evolution of mobile communication systems. 1G, 2G, 2.5G & 3G systems. IMT2000, FDD, TDD, FDMA, TDMA, CDMA, SDMA. Radio frequency spectrum and communication technology. Block diagram of mobile communication system. Problems of mobile communication: spectrum, propagation. Near far problem.	T S Rapaport: Pages 1-39, Jochen Schiller: Pages 7-15	4
2.	The cellular Concept – Introduction, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trucking and grade of services, Improving coverage & capacity in cellular system	T S Rapaport: Pages 57-93	6
3.	GSM standards and architecture, GSM Radio aspects, typical call flow sequences in GSM, security aspects. GPRS	Jochen Schiller: Pages 96- 120 Raymond Steel: 65-147	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4.	CDMA standards: Spread spectrum, direct sequence and frequency hop spread spectrum, IS-95 CDMA architecture, forward link and reverse link,cdma2000	Raymond Steel: 205-281 T S Rapaport: Pages 569- 582	8
5.	WCDMA: Frame structure, UTRA FDD, UTRA TDD, UMTS, architecture	Jochen Schiller: 136-155	4
6.	Introduction to WLAN: Infrastructure based and adhoc networks, IEEE 802.11, IEEE 802.11a, IEEE 802.11b. Bluetooth, WiMAX	Jochen Schiller: 201-238, 269-290	8
7.	4G Systems: Introduction to OFDM and MC-CDMA	L. Hanzo, T. Keller: 1-18, 203-217	6
		Total Number of Lectures	**44**

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1) T. S. Rappaport, Wireless Communications, PHI, 2002.

2) Mobile Communication, Jochen Schiller, Pearson.

Reference Books

1) WilliamC.Y.Lee,MobileCellularTelecommunications-Analog&DigitalSystems, Mc.Graw Hill,1995

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Jaypee University of Information Technology, Waknaghat

Department of CSE & IT

MOBILE COMPUTING

(Proposed Course Plan)

Course Coordinator:

Nishtha Ahuja
Department of Computer Science & Engineering

Course Information

Credit: 3-0-0 (L-P-T)

Semester: Even, Session: Jul – Dec 2015

Class: BTech (CSE), VII Sem

Total lectures: 42

Pre-requisites: Java Programming, Computer Networks, Operating Systems

Course Objective

Mobile Phones have emerged as truly pervasive and affordable information and communication technology platform in the last decade. So there is a growing need for a course which can teach students the skills needed to program and configure mobile devices and networks, enabling them to develop new and exciting applications for existing and emerging hardware technology. The objective of the course is to equip students on the fundamentals of mobile computing and the design mobile services. Learn the issues in mobile computing and communications from the hard- ware and software perspective. Understand the mobile IP stack and mobile web access, technologies and services.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assessment

- Internal Assessment

Quiz	10Marks
Project	10Marks
Assignment	5Marks

- Mid Term 30Marks
- End Term 45Marks

Total	**100 Marks**

Course Outcomes:

CO-1: Introduce enabling technologies of pervasive computing.

CO-2: Acquire solid knowledge on mobile networks and mobile computing.

CO-3: Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.

CO-4: Understand the concepts of Adhoc and wireless sensor networks.

CO-5: Understand the concepts of Mobile IP.

CO-6: To be able to analyze the performance of different handoff, roaming, and location update algorithms for cellular networks.

CO-7: Awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior.

CO-8: Describe the possible future of mobile computing technologies and applications.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

B.Tech CSE Programme Objectives (POs)

A graduate of the Computer Science and Engineering Program will demonstrate

PO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

PO-2: An ability to apply knowledge of mathematics, science, and engineering to real-life problems.

PO-3: Ability to model, understand and develop complex software and information management systems.

PO-4: An ability to function effectively within teams.

PO-5: An understanding of professional and ethical responsibility.

PO-6: An ability to communicate effectively, both in writing and oral.

PO-7: The broad education necessary to understand the impact of Computer Science and Engineering solutions in the societal and human context.

PO-8: A recognition of the need for, and an ability to engage in life-long learning.

PO-9: A knowledge of contemporary issues.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Correlation of COs to POs

Course Outcomes	Level of Attainment	Programme Educational Objectives									Assessment (%)
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	Familiarity	H	M	H	M	M	H	H	H	H	89
CO2	Familiarity	H	H	H	M	M	H	H	H	H	92
CO3	Usage	H	H	H	H	H	H	H	H	H	100
CO4	Assessment	H	H	H	M	H	H	H	H	H	96
CO5	Assessment	H	H	H	H	M	H	H	H	M	92
CO6	Assessment	M	H	H	H	H	M	H	H	H	92
CO7	Familiarity	H	M	M	H	H	H	H	H	M	89
CO8	Familiarity	H	M	M	M	M	H	H	H	H	85
Assessment (%)		95	87	91	71	84	95	100	100	91	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Lecture Plan:

S.No.	Chapter	Lectures	Chapter
1.	Introduction to Ubiquitous Computing	1	
2.	Introduction to Android Operating system • Introduction to the emerging technology • Architecture • Installation Setup • The Activity Class • The Intent Class • Permissions • Creating the UI • Storing and Retrieving Data • User Notifications • Broadcast Receivers • Networking • Location and maps • Sensors	9	Book 1 1 1 2 2 2 3,4 6 8 8 9 9
3.	Introduction to Windows Operating Systems • Architecture • Installation Setup • Introduction to XAML • Understanding the Navigation Model • Understanding the apps lifecycle and managing states • Building UI • Sensors • Storing and Retrieving data	9	Book 2 1 2 2 3 6 10
4.	Mid Sem project demo	1	
5.	WiFi • Physical Layer • Channel Coding • How the physical layer works • Link Layer MAC Protocols • Link Adaption Protocols • Energy Efficiency in WiFi • Cellular Systems	6	Book 3 Chapter 6 and topic 7.4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6.	Mobile IP • Mobility in Network Layer • Internet protocols for Mobile Applications • Single Hop Mobility • Mobile IP and Issues • Handoff Issues	4	Book 3 Chapter 1, 2
7.	Routing • Routing Protocols in MultiHop Networks • MultiHop routing metrics	3	Reference 4
8.	MANET	2	
9.	Student presentations on Emerging New Technologies in Mobile Computing Area	4-5	
10.	End Sem Project Demo	2	
	Total	**42**	

References:

Textbooks:

[1] W. Lee and K. Mittal, Beginning Android application development. Indianapolis, Ind.: Wiley Pub., 2011.

[2]A. Whitechapel and S. McKenna, Windows Phone 8 development internals. Redmond, Wash.: Microsoft Press, 2012.

[3]I. Stojmenovic, Handbook of Wireless Networks and Mobile Computing. Hoboken, NJ: John Wiley & Sons, 2002.

[4] Dr.S.S.Dhenakaran, A.Parvathavarthini (2013) 'An Overview of Routing Protocols in Mobile Ad-Hoc Network', International Journal of Advanced Research in Computer Science and Software Engineering, 3(2), pp. [Online]. Available at: www.ijarcsse.com

Reference Books:

[1] R. Meier, Professional Android application development. Indianapolis, IN: Wiley, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

[2] Microsoft Open Technologies, Inc., Windows Phone 8 Guide for Android Application Developers.

[3] Stalling, William, 2002. *Wireless Communications and Networks*. 2nd ed. Upper Saddle River, NJ 07458: Pearson

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

10B1WCI735: Cryptography and Network Security Techniques

Course Coordinator: Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE Ph. D(CSE), MBA(HR & IR), ME(Hons) Computer Science, B Sc Engineering(Hons)

Course Structure: 3 Credits(3L)

Prerequisites: Introduction to Computers
Knowledge of Computer Networks

Note: **This course will be a prerequisite for Network Management Course to be offered in 8th sem.**

Objectives:

1. Understand the basic security services e.g.Authentication, Access Control, Confidentiality, Integrity, and Non repudiation.
2. Understand the concepts of risk, threats, vulnerabilities and attack.
3. Know the important ethical and legal issues to consider in computer security.
4. Know the goals of end-to-end data security. [Familiarity]
5. Understand the role of random numbers and prime numbers in security.
6. Learn standard symmetric encryption algorithms[Assessment]
7. Learn the architecture for public and private key cryptography and how public key infrastructure (PKI) supports network security.
8. Learn the methods of digital signature and encryption.
9. Learn key management and how key exchange protocols work.
10.Learn security protocols at different layers of Network layer heirachy.
11.Learn futuristic cryptographic techniques like Eliptic Curve and quantum cryptography.
12.Learn the concept of trusted computing.
13.Learn the Web security Protocol.
14.Learn thelegal aspects of Cyber Laws.

Learning Outcomes: After completing this course, students will be able to:

1. Explain common attacks against network assets, the associated threats and vulnerabilities, and what network security personnel do to secure assets.
2. Explain how to use cryptography to help protect information and how to choose an appropriate encryption method for an organization.
3. Help protect information in an organization by using authentication and access control.
4. Deploy and manage certificates.
5. Help protect transmission of data by identifying threats to network devices and implementing security for common data transmission, remote access, and wireless network traffic.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC

6. Help protect Web servers against common attacks and configure security for Web browsers.
7. Help protect e-mail messages and instant messaging from common security threats.
8. Identify common security threats and vulnerabilities to directory services and DNS, and then apply security methods to help protect them.
9. Identify network perimeter threats and monitor perimeter security for a network.
10. Identify types of security policies to manage operational security, and then use these policies to ensure compliance by users in an organization.
11. Preserve business continuity by implementing a security-enhanced disaster recovery strategy, communicating risks to others, and performing secure backup and recovery.
12. Identify, respond to, and assist in the formal investigation of security incidents.
13. Implement security-enhanced computing baselines in an organization.

Course Text: "Cryptography & Network Security" by Stallings, William (Fourth Edition or later) will be used as the main text book, however the inputs will be supplemented with information from elsewhere wherever the same is required.

Course Outline:

S.No.	Topics	Chapter	Lectures
1	Foundation of Security & Cryptography: OSI security architecture, Security Policy,Classical encryption techniques(Substitution Techniques, Transposition Techniques and Staganography)	1,2	3
2	Mathematical Tools for Cryptography: Finite fields, number theory	4,8	1
3	Design Principle of Block Ciphers:DES	3	2
4	Block Cipher Algorithms: AES	5	3
5	Pseudo Random Numbers & Stream Ciphers: Multiple Encryption, Block Cipher modes of operation, stream ciphers, Confidentiality	6,7	4
6	Public Key Cryptography: RSA, Key management	9,10	4
7	Hashes & Message Digest:Authentication functions,Message authentication codes,Hash functions and their security	11,12	4
8	Digital Signature, Certificates & standards	13	3
9	Authentication:X.509 Authentication service	14	3
10	Electronic Mail Security:S/MIME	15	3
11	IP and Web Security Protocols:IPsec, Secure	16,17	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	socket layer and transport layer security, secure e-transaction.		
12	System Security : Computer Virus, Firewall & Intrusion Detection , Trusted systems, Security Investigation/Audit	18,19,20	4
13	Cyber Laws: IT ACT 2000, IT amendment ACT 2008		3
	Total		42

Evaluation Scheme:

Test 1	15
Test 2	25
Test 3	35
Attendence, Assignments etc	25(quiz=12,Assignment=9,Regularity=4)
Total	100

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

NON–LINEAR AND DIGITAL CONTROL SYSTEMS
(Elective Course)

Course Code:	14B1WEC734	Semester:	7th Semester
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. The ability to understand the characteristics of various types of nonlinearities present in physical systems.
2. The ability to carry out the stability analysis of non-linear control systems.
3. The ability to carry out the analysis and design of digital control systems.
4. The ability to design compensators for digital control system to achieve desired specifications.
5. The ability to represent digital control systems using state space models.
6. The ability to analyze the effect sampling on stability, controllability and observability.
7. The ability to design digital controllers for industrial applications.

Course Outcomes

After studying this course the students would gain enough knowledge

1. The ability to understand the characteristics of various types of nonlinearities present in physical systems.
2. The ability to carry out the stability analysis of non-linear control systems.
3. The ability to carry out the analysis and design of digital control systems.
4. The ability to design compensators for digital control system to achieve desired specifications.
5. The ability to represent digital control systems using state space models.
6. The ability to analyze the effect sampling on stability, controllability and observability.
7. The ability to design digital controllers for industrial applications.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	**Non-Linear Systems** Introduction to nonlinear systems, mathematical modeling, common physical nonlinearities in control systems: saturation, dead zone, backlash, Columb friction and on-off nonlinearity, concept of linearization of non-linear mathematical models, multivalued responses, describing function fundamentals, derivation of describing functions of nonlinearities and their applications to system analysis, unique characteristics of non-linear systems, jump resonance and limit cycle behavior, nonlinear state variable equations, nonlinear state variable models.	Text4/15	7
2.	**Stability Analysis of Non-Linear Systems**	Text 1/8, Text	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	Stability analysis by describing function method, Phase plane analysis, types of phase portraits, singular points, analytical method, method of isoclines. Lyapunov functions for linear and non-linear systems, statement of various stability terms in sense of Lyapunov, stability analysis by Lyapunov's first and second methods, Methods of constructing Lyapunov's functions for non-linear systems, Krasovskii's and variable gradient methods, Popouv's stability theorem for non-linear systems.	1/10, Text 4/13, Text 4/15	
3	**Design of Digital Control System** Configuration of basic digital control scheme, sampleand- hold elements, Mapping from s-Plane to z-plane, various representations of sampled data feed-back systems, Pulse transfer function, Stability and controller design uses z transform and difference equations, Jury stability criterion, bilinear transformation, z-domain specifications of control system design, Root locus of digital control systems, design of digital controllers, design of digital compensators.	Text 1/3, Text 1/4	10
4	**State Variable Analysis of Digital Control Systems** State descriptors for digital processors, conversion of state variable models to transfer functions, conversion of transfer functions to canonical state variable models, state description of sampled continuous time plants, state description of systems with dead-time, solution of state difference equations, controllability and observability, effect of sampling on stability, controllability and observability.	Text 1/6	8
5	**Applications of Digital Control Systems** Digital temperature control system, Digital position control system, Building blocks of a PLC, Ladder diagram programming instructions, case studies of automatic control applications.	Text 1/3	9
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Text Books

1. Text 1 Gopal M., Digital Control and State Variable Methods TMH Publishers
2. Text 2 Ogata, K., Discrete-time Control Systems, Pearson Education.
3. Text 3 Kuo B.C, Digital Control Systems, Wiley Publications.
4. Text 4 Nagrath I.J, Gopal M, Control System Engineering, New age International.

Reference Books

1. Hassan K. Khalil, Non Linear Systems, 3rd Edition, Prentice Hall.
2. Horacio J. Marquez, Nonlinear Control Systems Analysis and Design, Wiley Publications.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

10B1WPD734 Principles of Management

Course Goal

At the completion of this course, the student will be able to develop an appreciation of the intricacies of managing organizations in today's competitive environment. The relationship between adequately designed systems and processes and organizational performance will be clarified.

Course Objectives

At the end of the course the students will be able to understand:

1. Evolution of management thought over time and into the future
2. The various structures of organizations today and their impact on human effort
3. How is management exercised through design of the right systems and processes
4. How each system and process weaves individual effort together to achieve common goals.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	**10B1WPD734**	**Semester**	7
Subject Name	Principles of Management		
Credits	3	**Contact Hours**	3

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction to modern management	Google's Project Oxygen: Do Manager's really matter? Does Management Matter? Evidence From India Definitions, nature, purpose, Evolution of modern management theory and practices	5
2.	Social responsibility and Managerial ethics	Social responsibility- from obligation to responsiveness to responsibility, Businesses promoting positive social change, Social responsibility and ethics in today's world, Ethics training, Managing Ethical lapses and Social Irresponsibility	4
3.	Planning	Nature and purpose of planning, Types of plans and their uses - objectives,	5

JUIT, Waknaghat
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT

		strategies, policies and planning premises, Contemporary issues in planning- Relevance of planning in a dynamic environment	
4.	Decision making	Overview of Managerial decision making, Rationality, Bounded Rationality, Role of Intuition, Decision making - styles, biases and errors, Effective decision making in today's world.	4
5.	Organising	Work specialisation, Departmentalisation, Chain of command, Span of control, Mechanistic and Organic Structures, Traditional organizational designs, Contemporary organizational designs- Boundaryless, Virtual, Network organization, Effective organizing and organization culture	8
6.	Staffing	HRM process – recruitment, selection, training and development, compensation management, performance management, Contemporary issues – Downsizing, Workforce Diversity, Sexual Harassment, Work-life Balance, Controlling HR Costs	6
7.	Controlling	Controlling for Organisational Performance – Measures, Tools , Types of control, Balanced score card approach, Contemporay Issues in Control – Cross cultural differences, Controlling customer interactions, Corporate Governance	5
8.	Strategic Management	Importance of Strategic Management, Strategic Management Process, Need for Strategic Flexibility, New Directions in Organisational Strategies	3
9.	Managing in a Global Environment	Understanding the Global Environment, Different types of International Organisations, How do Organisations go International	2
		Total number of Lectures	42

Recommended Reading	
1.	Stephen P. Robbins, Mary Coulter & Neharika Vohra, Management, 10th Ed., Pearson ,2012

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2.	Ricky W. Griffin, Management – Principles and Applications, Cengage Learning, 2009
3.	Andrew DuBrin, Management – Concepts and Cases, Cengage learning, 2011

Methodology & Evaluation Scheme

Methodology to be used		Lectures, Case discussions, Group discussions on contemporary issues and group presentations	
Evaluation			
Theory		Internal assessment	25%
Test 1	15%	Attendance	5%
Test 2	25%	Class participation in case discussion	10 %
Test 3	35%	Group Presentation	10%

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

17B1WHS731 QUALITY MANAGEMENT

Course Goal

Quality management is a system that serves to control Quality in the critical activities of an organization by bringing together resources, equipment, people and procedures. It uses techniques and principles such as quality function deployment, Taguchi method, service quality management, quality audits and Six Sigma to control quality in every sphere of activity in an organization.

Course Objective

1. Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
2. Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
3. Critically appraise the organisational, communication and teamwork requirements for effective quality management
4. Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans

Detailed Syllabi

Lecture-wise Breakup

Subject Code	17B11WHS731	**Semester**	8
Subject Name	Quality Management		
Credits	3	**Contact Hours**	3

Module No.	Subtitle of the Module	Topics	No. of Lectures

Unit	Contents	Topic	Hrs
1	**The Engineer and QM link**	Introduction The engineer as a specialist The failure of engineering: educational systems: The UK experience	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

		The new breed of engineers Engineers' competences and the role of QM The evolution of engineers for Total Quality Management The engineer in a QM environment	
2	**Pioneers of QM**	How old is the quality concept? Why are the Japanese leading the field of quality? How the West has woken up to the importance of quality WE Deming ,Joseph M Juran , Philip B Crosby , Armand V Feingenbaum ,Bill Conway ,Kaoru Ishikawa, Genichi Taguchi , Shigeo Shingo, W G Ouchi	3
3	**Total Preventative Maintenance for QM**	Introduction What is quality? Some quality characteristics The quality processes What is meant by Quality Control? What is meant by Statistical Quality Control? What is meant by Total Quality Control? What is meant by Quality Assurance? What is meant by Quality Management? Some examples of QM models , QM - a boardroom place OM and productivity QM and Advanced Manufacturing Technology	3
4	**QM**	The meaning of quality systems . Why are Quality Assurance systems needed? The role of quality standards. The different stages of a quality assurance system . The implementation of quality systems . The ISO 9000 quality system British Standard BS *5750/ISO* 9000 . Registration and accreditation in quality systems	4
5	**QM: Tools and Techniques**	Introduction .Why use tools and techniques in QM? How do we define	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

		processes? Process variation and its causes . What are the tools and techniques for QM? Process capability. The implementation of Statistical Process Control	
6	**Total Preventive QM techniques**	Introduction . What is TPM? Failure patterns . Costs and benefits of TPM Some examples of TPM implementation Towards Zero Defect: Zero Breakdown Implementing TPM: Some guidelines	**3**
7	**Continuous Process Improvement- #TQM, Besterfield**	Juran Triology, Improvement Strategies , Types of Problems, The PDCA cycle, Problem solving Methods, Kaizen, Reengineering	**4**
8	**Leadership And Strategic Planning #TQM, Besterfield**	Leadership theory and practices, Creating the leadership system, Strategic Planning, leadership, strategy and organization structure, leadership for Quality ; The Seven Management And Planning tools,	**4**
9	**Essentials of QM**	Introduction Internal customer-supplier chains External customer- supplier chains From customer satisfaction to customer commitment from a win-lose to a win-win situation Towards single sourcing-supplier chains The power of communications in customer-supplier chains.	**3**
10	**Principles of Six Sigma** **#The Management and Control of Quality, Evans Lindsay**	The statistical basis of Six Sigma ; Six Sigma Problem Solving (The DMAIC Methodology ; Tools and Techniques; Design for Six Sigma Six sigma in services and small organizations Six Sigma and Lean Production Lean Six sigma and Services	**3**
11	**Benchmarking**	Define benchmarking. Reasons to benchmark Process, Deciding what to	**5**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

		Benchmark, Pitfalls and criticism of Benchmarking	
	Total Hours		**42**

Methodology

The course will be taught with the aid of lectures and case studies. Lectures are combined with hands-on practice and discussion in class. . The students will be provided with research papers which they will analyze and study to further strengthen their understanding of the topics. Students need to read in advance case studies in order to be able to answer the questions. Groupwork outside the classroom is also needed for the students to formulate a strategy for an assigned company.

Evaluation Scheme

Exam	Marks
Test 1	15
Test 2	25
Test 3	35
Case study\presentation	20
Assignment	5

Recommended Reading (Books/Journals/Reports/Websites etc	
1.	Dale H. Besterfield, Pearson, *Total quality Management*, Pearson Education
2.	Evans's. James, Lindsay M. William , *The Management and Control of Quality,* Cengage Learning
3.	H.Lal, Lt. Gen ,Wiley Eastern Limited, 1990 , *Total Quality Management*
4.	Bounds Greg , McGraw , *Beyond Total Quality Management*
5.	Kanishka Bedi, Oxford Higher Education, *Quality Management*
6.	http://www.evans.swlearning.com
7.	www.cengage.com/international

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Robotic Systems and Control

(Elective Subject)

Course Code:	17B1WEC733	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. The Robotics' chief objective has always been associated with working for new and updated technologies, for example embedded systems, microcontrollers and VLSI.
2. To use the robotic system for logic building and programming.
3. To use the robotic kits to do any given engineering task which may have not been taught in class.

Course Outcomes

After studying this course the students would gain enough knowledge

1. Students will be equipped with the automation and brief history of robot and applications.
2. Students will be equipped with the principles of various sensors, actuators and their applications in robots.
3. Be able to analyze any physical system using mathematical model.
4. Be able to do the path planning on robotic systems using various control strategies.
5. Students will be equipped with the simulation and hands on robotic kits.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Robotics: Introduction – brief history, types, classification and usage, Science and Technology of robots, textbooks and research journals, introduction to simulation environment.	Spong : Chapter 1	3
2.	Elements of Robots: Joints, links, actuators, and sensors: Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.	Spong : Chapter 1, 2 eLSI project material	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	Robot Arm Kinematics and Dynamics: Forward kinematics, inverse kinematics, Lagrange formulation of dynamics.	Spong : Chapter 3, 4, 6	8
4	Motion Planning and Control: Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of constrained manipulators, Cartesian control, Force control and hybrid position/force control, Advanced topics in non-linear control of manipulators.	Spong : Chapter 7, 8, 9	8
5	Modeling and Control of Flexible Robot Manipulators: Models of flexible links and joints, Kinematic modeling of multi-link flexible robots, Dynamics and control of flexible link manipulators, Numerical simulations results.	Craig: Chapter 5 NPTEL lectures	6
6	Robot Programming: MATLAB and other simulation platforms, Hands on experiment on robotic kits, working and implementing various Ad-on modules.	eLSI project material	6
		Total Number of Lectures	41

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. Spong and Vidyasagar, "Robot Dynamics and Control", John Wiley and Sons.
2. J. J. Craig, "Introduction to Robotics- Mechanics and Control", Pearson.
3. Sciavicco and Siciliano, "Modeling and Control of Robot Manipulators", McGraw Hill International Edition.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Reference Books/ Other resources

1. NPTEL Lectures: http://nptel.ac.in/courses/112101099/
2. Material provided by IIT Bomaby under eLSI project:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

TIME-FREQUENCY ANALYSIS AND ITS APPLICATION

(Elective Subject)

Course Code:	**17B1WEC731**	**Semester:**	**7th Semester, B. Tech (ECE)**
Credits:	**3**	**Contact Hours:**	**L-3, T-0,P-0**

Pre-requisites: Signal & System, Digital Signal Processing

Course Objectives:

The objective of this course to provide the understanding of basics concept and MATLAB based implementation of time-frequency analysis (TFA) tools for various applications.

Course Outcomes

After the study of this course students will be able to:

1. Understand the spectral analysis of the signals.
2. Understand the basics concept of the short time Fourier transform.
3. Familiar with the basics concept of the discrete wavelet transform /continuous wavelet transform.
4. Understand the basic concept of the distribution based Time-Frequency Analysis tools
5. Develop the TFA based algorithms for various applications.

Course Contents :

Unit	Topics	Text book	Lectures
1	**Introduction to spectral analysis:** Parametric and Non-Parametric methods	[1]	08
2	**Basic Concepts & Definition of time-frequency tools:** Bandwidth Equation, uncertainty concept, Instantaneous Frequency, Analytic Signals, Multicomponent Signals etc.	[2]	04
3	**Short Time Fourier Transform:** Conditions for valid windows, Time domain and frequency domain formulations, Duality in the interpretations, MATLAB based implementation of STFT	[2] & [6]	04
4	**Wavelet transforms:** Introduction and basic concept of continuous and discrete wavelet transform, MATLAB based implementation of wavelet transform.	[3] &[6]	04
5	**Distributions based time-frequency tools:** Introduction and basic concept Wigner-Ville distribution & Cohen's class of distribution etc. MATLAB based implementation of distribution based time-frequency analysis tools.	[2] &[4]	06
6.	**Case studies:** Joint Time-Frequency Transform/ Inverse Synthetic Aperture Radar, Joint Time-Frequency Representations/Time-Varying Signals, Economic Data Analysis with the Gabor Spectgrogram, Gabor Spectrogram in Ultrasonic Nondestructive Materials Evaluation, Applications of Time-Frequency Signal Processing in Wireless Communications and Bioengineering	[2], [3], [4] & [5]	16
	Total Hours		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
    1. 10 Marks : Class performance, Tutorials & Assignments
    2. 10 Marks : Quizzes
    3. 5 marks : Attendance

Text Books

1. Hayes, M.H.,"Statistical digital signal processing and modeling" Willey publishers
2. Boualem Boashash, Time-Frequency Signal Analysis and Processing: A Comprehensive Reference, Elsevier publishers, 2003
3. S. Mallat, A Wavelet Tour of Signal Processing - The Sparse Way. Elsevier, Third Edition, 2009.
4. L. Cohen, Time-Frequency Analysis. Prentice Hall, 1995.
5. Hao Ling and Victor C. Chen, Time-frequency Transforms for Radar Imaging and Signal Analysis, Artech House Publishers, 2000
6. http://nptel.ac.in/courses/117101001/: The lecture series on Wavelets and Multirate Digital Signal Processing created by Prof. Vikram M. Gadre in NPTEL.

REFERENCE BOOKS

1. Stanskovic L., Dakovic, M., Thayparan, T., Time-Frequency Signal Analysis and Processing: A Comprehensive Reference, Artech House Publishers.
2. Karlheinz Gröchenig, Foundations of Time-Frequency Analysis, Birkhäuser publishers, 2001
3. M. Vetterli, J. Kovacevic, and V. K. Goyal, Fourier and Wavelet Signal rocessing. Booksite: **http://fourierandwavelets.org/terms.php**

OTHER RESOURCES

Time-frequency toolbox (MATLAB) is available for download from **http://tftb.nongnu.org/**

http://nptel.ac.in/courses/117101001/1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Underground Technology

COURSE CODE: 10B13CE736

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Geotechnical Engineering and Foundation Engineering

Course Objectives:

1. To impart the knowledge of recognizing the diversity and complexity of underground excavations and associated works such as foundation construction.
2. To provide guidance for support selection of underground openings which is dependent upon the ground conditions, excavation size and shape and excavation method employed.
3. To inculcate the understanding of ground improvement and develop knowledge of different ground improvement techniques.
4. To understand, analyze and design flexible retaining structures
5. To provide knowledge of tunneling and various aspects of tunnel engineering.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the conditions and structures required for underground structure.	Familiarity
CO-2	Stabilize excavation for underground construction using sheet piles, anchored bulkheads, management of ground water conditions and apply dewatering methods.	Assessment
CO-3	Design and understand the construction methodology of deep foundation, analyze side - support systems for underground excavations.	Assessment
CO-4	Solve problems related to required ground conditions, side – support system, lining and design tunnels with its various components.	Usage
CO-5	Understand the construction method technologies for side -support system required for underground excavation , coffer dams, caissons, wells, basement and tunnel construction.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction**: Introduction to various underground structures, Underground construction methodology&equipments.	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

2	**Underground construction**: Excavations, soil support methods, diaphragm walls, reinforcedearth.	5
3	**Ground Water management**: Management of groundwater, dewatering methods Coffer dams, Caisson & wells.	6
4	**Permanent Support and Temporary Support system**: Methods of Basement construction, bracing system.	8
5	**Ground Improvement**: Grouting, In – situ Densification: Preloading, Compaction Grouting, Dynamic Compaction, Blast densification, Vibro–Compaction and Vibro–Replacement, Compaction piles, Reinforcement of embankments and foundations.	6
6	**Tunnels**: Introduction, Tunnel stabilization and lining, Cut and Cover Tunnels, Bored Tunnels, Immersed Tube Tunnels, Water Conveyance Tunnels, Micro-tunnels.	6
7	**Underground Conduits**: Ditch Conduits, Positive Projecting Conduits, Negative Projecting Conduits, Imperfect Ditch Conduits, Tunneled Conduits.	6
Total lectures		42

Suggested Text Book(s):

1. Geotechnical Engineering by Gulati and Dutta(TMH)
2. Tunnel Engineering Handbook edited by Bickel, Kuesel andKing

Suggested Reference Book(s):

1. Foundation Engineering Handbook, edited by Winterkorn &Fang
2. Construction technology by Roy Chudley& RogerGreen
3. Advance Construction Technology by Roy Chudley& RogerGreen
4. Railway Bridges and Tunnels by Vazirani andChandola

Other useful resource(s):

1. Link to NPTEL course content:https://nptel.ac.in/courses/105103093/24
2. Links related to topics of course:https://nptel.ac.in/courses/10510 8069/5 https://freevideolectures.com/course/3269/advanced-foundation-engineering/25https://nptel.ac.in/courses/105106055/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Underground Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	1	2	2	0	3	3	1	1	**2.0**
CO-2	2	3	3	2	2	3	2	1	2	1	1	3	**2.1**
CO-3	3	2	2	2	1	3	1	1	2	2	2	3	**2.0**
CO-4	3	3	3	2	2	3	2	2	1	1	1	2	**2.1**
CO-5	3	3	3	2	0	2	1	1	2	1	2	3	**1.9**
CO-6	2	2	2	2	1	3	3	0	3	2	2	3	**2.1**
Average	**2.67**	**2.5**	**2.67**	**2.17**	**1.17**	**2.67**	**1.83**	**0.83**	**2.17**	**1.67**	**1.5**	**2.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Civil Engineering

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Artificial Intelligence

COURSE CODE: 18B1WCI742

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structure, Discrete Structure

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction:** Intelligence, Definitions of Intelligent Agents **Single-Agent Search:** Breadth-first, Depth-first and Iterative Deepening Search, Heuristic Search (A* search), Stochastic Local Search (Simulated Annealing, Genetic algorithms)	7
2	**Adversarial Search:** Minimax Search, Alpha-beta pruning, Stochastic Games and Expectiminimax **Knowledge Representation and Logic:** Propositional Logic, Propositional Inference , First-Order Logic, Propositional Inference (Forward chaining, Backward chaining)	7
3	**Reasoning Under Uncertainty:** Probability Bayes Rule , Bayesian Networks, Bayesian Inference	7
4	**Machine Learning**: Definition and examples of broad variety of machine learning tasks, including classification, Inductive learning, Simple statistical-based learning, such as Naive Bayesian Classifier, decision trees, The over-fitting problem, Measuring classifier accuracy	11
Total lectures		**32**

Suggested Text Book(s):

1. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
2. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Machine Learning by Tom M. Mitchell
3. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb

Other useful resource(s):

1. Link to NPTEL course contents:
   i. https://nptel.ac.in/courses/106105077/
   ii. https://nptel.ac.in/courses/106105079/
2. Link to topics related to course:
   i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   ii. https://ai.google/education/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Artificial Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	2	1	2	1	2	2	2	1.9
CO-2	3	3	3	1	3	2	1	2	1	2	3	2	2.2
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Weightage	3	3	3	2.2	2	1.4	1.6	2	1.6	2	2.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

15B1WCI833: Big Data Analytics

Course Credit: 3
Semester: VIII

Course Coordinator: Dr. Pardeep Kumar

Introduction

This course introduces basic technology (algorithms, architectures, systems) and advanced research topics in connection with large-scale data management and information extraction techniques for big data. The course will start by introducing the fundamentals of Big data and cover modern distributed database systems and algorithms and Big data systems adopted in industry and science applications. Distributed storage and parallel processing and architectures that support data analytics will be examined, and students will learn how to implement a distributed data processing system. The course will also cover critical topics in mining and knowledge discovery of big data, with applications in social analytics, cyber security, and information networks, among others that are already in public eye.

Course Objectives (Post-conditions)

Knowledge objectives:

1. Understand the need for Bid Data Analytics

2. Master the concepts of large scale file systems and map reduce framework

3. Master the concepts of mining data streams

4. Master the concepts of Link analysis and frequent item sets discovery from Big data

5. Master the concepts of clustering for streams and parallelism.

Application objectives:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Understand and apply the Big Data Analysis techniques to real world problems including social analytics, cyber security, and information networks, among others that are already in public eye.

2. Being able to describe and apply the Data Analytics lifecycle to Big Data projects including set up of smart cities.

Expected Student Background (Preconditions)

1. Good knowledge of Statistics
2. Working knowledge of databases
3. Good knowledge of data structures and algorithms

Topics Outline:

Serial Number	Topics	Hours
1	Introduction to Big Data: Big data time line, Why this topic is relevant now? Is big data fad? Where using big data makes a difference? Introduction to statistical modeling and machine learning, Ordinary data processing versus big data processing: Challenges and opportunities	3
2	Map Reduce and the New Software Stack: Distributed File Systems, Map Reduce, Algorithms Using Map Reduce, Complexity Theory for Map Reduce	3
3	Mining Data Streams: The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments and Windowing, Decaying Windows	5
4	Link Analysis: Page Rank and Efficient Computation of Page	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Rank, Topic-Sensitive Page Rank, Link Spam, Hubs and Authorities	
5	Frequent Item sets from Big Data: The Market-Basket Model, Market Baskets and the A-Priori Algorithm, Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream	7
6	Clustering for Big Data: Introduction to Clustering Techniques, Hierarchical Clustering, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism	8
7	Mining Social Network Graphs: Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs, Finding Overlapping Communities, Neighborhood Properties of Graphs	6
8	Recommendation Systems: A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering and Dimensionality Reduction	5
	Total Lectures	42

References

1. Anand Rajaraman and Jeffery David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012
2. Jared Dean, Big Data, Data Mining and Machine Learning, Wiley Big data Series, 2014
3. Judith Hurwitz, Alan Nugent, Fern Halper and Marica Kaufman, Big Data for Dummies, Wiley Press, 2013

Evaluation Scheme:

S. No.	Examination	Marks
1	T1	15
2	T2	25
3	T3	35
4	* Internal Marks	25

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

*Internal Marks Breakdown:

Assignments 9 marks (3x3)

Quizzes 12 marks (3x4)

Regularity 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Bio-resources and Industrial Product (*Core Course*14B1WBT 741)

(B.tech, Sem VIII) **Credits 3**

Lectures 3 Tutorial 0 Practical 0

Pre-requisites: Biochemistry, fundamental biology, chemistry

Course Objectives (Learning Goal):

The use of natural, renewable and/or bio-resources is becoming more and more important to for sustainable growth along with enormous challenges at economic, environmental level. The Objectives of the course are

1. To make the student understand the value of bio-resources
2. Introduction to bio-renewable products, processes and their related industrial sectors viz. Medicine, Food , agriculture , bio-chemicals, bio-composites, bio-energy & biofuel, and forest products.

Course Assessment:

Test 1	15
Test 2	25
Test 2	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

At the end of the course students will have a fundamental understanding of the natural bioresearches and able to

Co-PI: Define "bioproduct" to reflect the scope and focus of opportunities to understand environmentally sustainable science-based processes of conversion of living organism-based resources into manufactured goods

Co-PII:. Develop a workable concept of bio-resource utilization with respect to broad economic feasibility, considerations of bio-resource availability, conversion (technologies) and receptor industries (markets).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Outline

S.N.	Topic		Lecture
1	Overview	• Resources (Renewable & Non-renewable) • Bio-resources • Bio-resources Engineering • Different Scale of Bio-resource Engineering	4
	Raw Material Resource	• Microbial Bio-resources • Plant Bio-resources • Animal Bio-Resources	6
2	Industrial Products	• Novel Plant Bioresources: • Medicine • Food • Cosmetics	12
3	Industrial Products	• Animal Bioresources: • Medicine • Food • Cosmetics	5
4	Industrial Products	• Microbial Bioresources: • Medicine • Food • Cosmetics	6
5	Processing Technology	• Biorefinery Concept • Processes for converting Raw material to biobased product • Novel Development in Procesing Technology	6
6	Case Study	• Case study of lignocellolose-Ethanol Processing	2

Methodology

The course will be taught through lectures. Apart from the discussions on the topics covered in the lectures, presentations, assignments in the form of questionnaires will also be given.

Internal Assessment

Assessment	Marks
Quiz/presentations	15
Assignment	5
Attendance	5
TOTAL	**25**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Books and references

Text Books:

- ✓ Renewable Bioresources: Scope and Modification for Non-food Applications Editors CHRISTIAN V. STEVENS
- ✓ Biotechnology for Agro-Industrial Residues Utilisation Poonam Singh nee' Nigam · Ashok Pandey
- ✓ Emerging Bioresources with Nutraceutical and Pharmaceutical Prospects: Seema Patel
  San Diego State University, San Diego, California, USA, Springer
- ✓ Dairy Chemistry and Biochemistry P.F. FOX and P.L.H. McSWEENEY Department of Food Chemistry University College, Cork Ireland

Reference Books and material

- ✓ Review articles on relevant topics from diverse sources
- ✓ *BioResources* (ISSN: 1930-2126): a peer-reviewed online journal devoted to the
- ✓ science and engineering of lignocellulosic materials, chemicals, and their applications for new uses and new capabilities

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

COURSE DESCRIPTION

Course Name:	CLOUD COMPUTING
Course Code:	12B1WCI831
Course Credits:	3 (3-0-0)
Branch and Semester:	8th Semester [CSE, IT]
Session:	Jan – Jun, 2018
Last updated on:	04-12-2017
Faculty Coordinators:	**Dr. Rajinder Sandhu**

Pre-requisite Course: Computer networks and Operating system.

Description & Rationale:

Cloud computing is the latest technology in the field of computers and Internet based services. This new technology has helped businesses and individuals to save data efficiently in a cost effective manner. This course will provide an understanding of the concept, standards, products and practical methods pertaining to cloud computing and will be helpful to students and researchers working in the field of cloud computing.
Cloud Computing refers to all the definitions, terminologies, technologies and existing cloud working models. The course also includes cloud architectures, service models. The aspects of algorithms for Map-Reduce are also included in this course.

Objectives:

- To demonstrate an understanding of cloud computing concepts, standards, and algorithms including Map-Reduce and graph protocols.
- To apply cloud computing standards to manage practical networks
- To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
- To demonstrate in-depth understanding of various aspects of cloud computing and be able to implement cloud services in an effective manner.

Course Outcomes:

S. No.	Course outcomes (Data Analysis and Simulation Techniques) (16B28CI681)	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To learn basic concepts of data intensive applications and Map-Reduce	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-3	To learn basic concepts of Virtualization and compare different Virtualization Techniques	Assessment
CO-4	To understand Mobile Cloud Computing and its role in cloud computing implementation.	Assessment
CO-5	Study various Cloud technologies and advance topic of cloud computing.	Usage

Course Contents / Lecture Plan:

S.No.	Topics	Hrs.
1	Cloud computing – Definition, Terminologies	1
2	Cloud architecture and service models	3
3	Utility computing, grid computing	5
4	Cluster computing and Google cluster architecture	2
5	Data – intensive computing concepts	2
6	MapReduce and graph algorithms	4
7	Apache Hadoop	2
8	Google's PageRank algorithm and its implementation with MapReduce	3
9	Virtualization technology	2
10	Xen hypervisor	1
11	Server virtualization, desktop virtualization, storage virtualization	4
12	Workloads and software infrastructure for a datacenter	3
13	Datacenter hardware, energy and power efficiency in a datacenter	3
14	Mobile cloud computing	4
15	Disaster recovery in cloud, security and privacy issues with cloud computing	1
16	Case studies – Google File System (GFS), Google BigTable Data Storage system, Amazon EC2 and S3, Microsoft's Azure.	2
	Total	42

Maintenance of Records:

Students are expected to keep records of homework assignments (to be posted on students resource from time to time) neatly in suitable hard bound notebooks separately (one for each).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. A project problem is to be taken up and implemented as a continuous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Tools and Technologies:

Virtualization and Cloud Software's

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (5) - 9 Quizzes (5) - 12 Attendance - 4

Text Book:

T1: Cloud Computing Bible by Barry Sosinsky; Wiley Publishing
T2: Hadoop – The Definitive Guide, Second Edition by Tom White; O'Reilly and Yahoo Press
T3: Data Intensive Text Processing with MapReduce by Jimmy Lin and Chris Dyer; Morgan and Claypool Publishers
T4: The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers

References:

R1: Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
R2: Programming Amazon EC2 by Jurg van Vliet and Flavia Paganelli; O'Reilly Publishers
R3: Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
R4: The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Attainment of Course Outcomes (COs)

Course: Cloud Computing (12B1WCI731)					
Attainment of Course Outcomes (COs)					
Sr No	**Course Outcomes**	**Attainment % of students>= 60%**	**Level 60%/70%/80 %**	**Total Weightage**	**Remarks**
1.	CO-1				
2.	CO-2				
3.	CO-3				
4.	CO-4				
5.	CO-5				

Attainment Levels:
Attainment Level 1: 60% of Students attain >= 60% Marks.
Attainment Level 1: 70% of Students attain >= 60% Marks.
Attainment Level 1: 80% of Students attain >= 60% Marks.

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

S. No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Avg.
CO-1	H	L	L	L	M	M	L	M	M	L	M	H	55%
CO-2	H	M	L	M	M	M	L	M	M	L	H	M	58%
CO-3	M	M	H	M	M	L	H	M	L	L	L	L	55%
CO-4	M	M	H	M	M	L	H	M	L	L	L	L	55%
CO-5	H	H	H	H	H	L	M	L	M	M	H	M	66%
Average Score	72%	60%	64%	60%	64%	48%	60%	56%	52%	44%	56%	56%	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Attainment of PSOs through Cos

Attainment of PSOs through COs				
Sr No	PSO-1	PSO-2	PSO-3	PSO-4
CO-1				
CO-2				
CO-3				
CO-4				
CO-5				
Average Score				

Program Specific Outcomes	
PSO-1	Detailed Knowledge of contemporary issues in CSE.
PSO-2	Strong skills in learning new programming environments.
PSO-3	Ability to analyse, design, model, develop , test and manage complex software and information management systems.
PSO-4	Analysing the impact of Computer Science and Engineering solutions in the societal and human context.

Signature of Faculty

Remarks of HOD

Signature of HOD

Cloud Computing

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Molecular Evolution

15B1WBI834 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology, evolutionary biology, functional genomics and various kind of graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop functional and evolutionary genomic understanding of biological entities for various kind of lineages for biological data types such as DNA, RNA, Genes, Proteins etc.

Course Assessment:

T-1 test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis

CO II: Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information

CO III: Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data

Topics covered:

Introduction to molecular evolution and its role in the regulation of various biological processes.

Introduction to evolutionary biology, functional genomics, basics of data types for biological

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

sequences their importance and applications in further analysis. Genes, operons, regulons, stimulons, genomes, proteins, proteomes etc. Patterns of base composition and codon usage, gene duplication, pseudogenes, orphan genes, gene gain and gene loss processes, overlapping and nested genes, exonization, intron and RNA editing, functional convergence, hypothetical proteins and their annotations. Various kind of mutations and selection pressure and related theories. Description of models, methods and algorithms that are most useful for analysing the ever-increasing supply of molecular sequence data, with a view to furthering our understanding of the evolution of genes, proteins, and genomes. Models of nucleotide substitution, models of amino acid and codon substitution, phylogeny reconstruction: Overview, Maximum Likelihood methods, Bayesian methods, comparison of methods and tests on trees, molecular clock and estimation of species divergence times, neutral and adaptive protein evolution, simulating molecular evolution.

Text and Reference books

1. Molecular Evolution
   by Dan Graur and Wen-Hsiung Li, Sinauer Associated Inc. Pub., USA
2. Computational Molecular Evolution
   by Ziheng Yang, Oxford Series in Ecology and Evolution
3. Molecular Evolution: A phylogenetic approach
   Rodric DM Page and Edward C Holmes, Blackwell Science Ltd.
4. Inferring Phylogenies
   J. Felsenstein, . Sinauer Associated Inc. Pub., USA
5. Molecular Evolution and Phylogenetics
   Masatoshi Nei and Sudhir Kumar, Oxford University Press
6. Bioinformatics and Molecular Evolution
   by Paul G Higgs, Blackwell Publishing

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis	H	H	H	L	H	H	M	86
CO-II	Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information	H	H	H	M	H	H	M	90
CO-III	Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data	H	H	H	M	H	H	H	95
	Assessment (%)	100	100	100	56	100	100	78	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Jaypee University of Information Technology, Waknaghat

COURSE DESCRIPTION

Course Name:	COMPUTER GAME DESIGN
Course Code:	17B1WCI812
Course Credits:	3 (3-0-0)
Branch and Semester:	8th Semester [CSE, IT]
Session:	Jan – Jun, 2018
Last updated on:	07-12-2017
Faculty Coordinators:	**Mr. Puneet Kumar Jain**

Pre-requisite Course:

Description & Rationale:

This course is an introduction to current and future technologies for computer game design and scripting. Topics include graphics, game scripting, game engines, motion control, narrative in games, game interfaces, artificial intelligence, music and sound, "Serious Games" and social and interface issues of game development.
Students enrolled in Computer Game Design program will have the opportunity to learn techniques for using interactive storytelling to design games. Program coursework exposes students to design processes such as planning, prototype development, and testing. Students also learn about theoretical and conceptual understanding of the field of game design, along with practical exposure to the process of creating a game. The coursework describes the deepest and most fundamental principles of game design.

Objectives:

- We will discuss games and game design. It includes the history and philosophy of games, the game production process
- We will discuss introduction to the electronic game design and development careers
- We will discover what the components of games are, and what parts of games are influenced by their design
- We will learn several ways to approach the design of a game, and processes and best practices for prototyping, play testing and balancing a game after it has been designed

Course Outcomes:

S.NO.	Course outcomes (Computer Game Design) (17B1WCI812)	Level of Attainment
CO-1	To gain knowledge of the Role of the Game	Familiarity
CO-2	To have exposure to structure of game	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-3	To have hands on skills to work with formal elements of game design	Computational skills
CO-4	To have hands on skills to Working with Dramatic Elements	Assessment
CO-5	To have hands on skills to Working with System Dynamics	Assessment
CO-6	To acquire knowledge of conceptualization	Technical skills
CO-7	To learn game prototyping	Technical skills
CO-8	To gain understanding of play testing, functionality, completeness and balance in game design.	Technical skills
CO-9	To have exposure to build teams for computer game designing	Assessment

Course Contents / Lecture Plan:

Chapters	HRS
Chapter 1: The Role of the Game: An Advocate for the Player, An Advocate for the Player, Passions and Skills, A Play centric Design Process, Designers You Should Know, The Iterative Design Process, Designing for Innovation, Conclusions.	4
Chapter 2: The Structure of Games Go Fish versus Quake, Engaging the Player, What is a Puzzle?, The Sum of the Parts, Defining Games, Beyond Definitions, Conclusions.	4
Chapter 3 Working with Formal Elements Players, Persuasive Games, Objectives, Procedures, Resources, Conflict, Boundaries, Outcome, Conclusions.	4
Chapter 4 Working with Dramatic Elements Challenge, Play, Premise, Character, Story, The Two Great Myths of Interactive Storytelling, World Building, The Dramatic Arc, Conclusions.	4
Chapter 5 Working with System Dynamics Games as Systems, System Dynamics, Deconstructing Set, Interacting with Systems, A Conversation with Will Wright, Tuning Game Systems, Table of Contents ix Conclusions.	4
Chapter 6 Conceptualization Coming Up With Ideas, Brainstorming Skills, Alternate Methods, Editing and Refining, Electronic Arts Preproduction Workshop, Turning Ideas into a Game , Where Do Game Ideas Come From?, Conclusion.	4
Chapter 7 Prototyping Methods of Prototyping, Catastrophic Prototyping and Other Stories, Prototyping Your Original Game Idea, The Design Evolution of Magic: The Gathering, Making the Physical Prototype Beer, Beyond the Physical Prototype, Conclusions.	4
Chapter 8 Digital Prototyping Types of Digital Prototypes , Using So ware Prototypes in Game , Prototyping for Game Feel , Designing Control Schemes, Prototyping Cloud , Selecting Viewpoints, x Table of Contents Effective Interface Design, Prototyping Tools, Conclusions.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Chapter 9 Play testing Play testing and Iterative Design, Recruiting Play testers, Conducting a Play testing Session, Methods of Play testing, 256 Why We Play Games, The Play Matrix, Taking Notes, Basic Usability Techniques, Data Gathering. Test Control Situations, How Feedback from Typical Gamers Can Help Avoid Disappointing Outcomes, Play testing Practice ,Conclusions.	4
Chapter 10 Functionality, Completeness, and Balance What Are You Testing For?, Is Your Game Functional?, Is Your Game Internally Complete?, Is Your Game Balanced? , A Conversation with Rob Pardo, Techniques for Balancing Your Game, Conclusions.	3
Chapter 11 Stages of Development Stages Defined, From Classroom to Console: Producing flow for the PlayStation, How to Make a Project Plan, Business Opportunities for Independents, Conclusions.	3
	Total Hours: 42

Maintenance of Records:

Students are expected to keep records of homework assignments (to be posted on student's resource from time to time) neatly in suitable hard bound notebooks separately (one for each). The same will be submitted to the TA in the Lab on or before the scheduled time.

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. These are further explored and expanded through a series of laboratory-based sessions. A project problem is to be taken up and implemented as a continous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study and laboratory work. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment - 9 Quizzes - 12 Attendance - 4

Text Book(s):

T1: Game Design Workshop, 3rd Edition: A Playcentric Approach to Creating Innovative Games is a book on game design by Tracy Fullerton, originally published by CMP Books

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Reference Book(s):

R1: A Theory of Fun for Game Design, by Koster
R2: Understanding Comics: The Invisible Art, by McCloud

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO-PO Mapping(10B11CI401 Microprocessors and Controllers)

Srl	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO-1	H	M	H	L	M	H	H	M	L	M	M	M	72%
CO-2	H	H	H	L	M	H	H	H	M	M	M	M	81%
CO-3	H	H	H	L	M	H	M	H	M	M	H	H	83%
CO-4	H	H	H	H	M	H	H	M	M	M	H	H	89%
CO-5	H	H	H	M	M	H	H	H	M	M	H	H	89%
CO-6	H	H	H	M	M	M	H	M	M	M	M	M	78%
CO-7	H	H	H	M	M	M	M	M	M	M	H	M	78%
CO-8	H	H	H	H	M	H	H	M	M	M	H	H	89%
CO-9	H	H	H	H	M	H	H	H	M	M	H	M	89%
	100%	96%	96%	96%	63%	93%	93%	81%	63%	67%	89%	81%	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Jaypee University of Information Technology, Waknaghat

COURSE DESCRIPTION

Course Name:	**Design and Analysis of Real World Algorithms**
Course Code:	17B1WCI814
Course Credits:	3 (3-0-0)
Branch and Semester:	8nd Semester
Session:	Jan – Jun, 2018

Description & Rationale:

This course covers how algorithms and theory are used in "real-world" applications. The course will cover both the theory behind the algorithms and case studies of how the theory is applied.

Objectives:

- Interesting algorithms arise in many real world applications in a broad variety of areas. Getting a better understanding of where and how these algorithms are used can be valuable in many ways. It can help in the teaching of algorithms by supplying up-to-date examples of the contexts in which algorithms are used. It can help make effective use of algorithms in industry by allowing better sharing of experiences. It can help motivate new problems to consider, or can improve our understanding of the models and the assumptions we make in various problem domains. It can give us a better feeling of what it takes to have industry use algorithms, and it can help us better understand what factors are important in the design of algorithms.

- Develop ability to design and analyze real world algorithms.
- Apply real world algorithms to various examples and real life applications

Course Outcomes:

S.NO	Course outcomes (Design and Analysis of Real World Algorithms) (17B1WCI814)	Level of Attainment
CO-1	To acquire knowledge of Machine learning algorithms	Familiarity
CO-2	To gain knowledge on the notions Cryptographic algorithms	Assessment
CO-3	To have hands on Network Algorithms and their applications in problem solving.	Assessment
CO-4	To have hands on skills to evaluate Compression algorithms and their applications and implementations in day to day problem solving.	Assessment
CO-5	To evaluate different kinds of Geometry and graphics algorithms and their applications and implementations in simulations.	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

CO-6	To gain understanding of Algorithms for Big Data : representation and algorithms	Usage

Learning Outcome:

Students will learn:

- What is the process of getting algorithms used in real world?
- How important are constants and how important are asymptotics in practice?
- Are there application domains in which algorithms should be playing a larger part?
- How do we deal with the tension between (a) creating broadly useful algorithms for generic problems, and (b) meeting the needs of a specific client?
- The real world is noisy. How should algorithms deal with noisy input data?

Pre-requisite Course: Introduction to Algorithms

Maintenance of Records:

Students are expected to keep records of homework assignments (to be posted on student's resource from time to time) neatly in suitable hard bound notebooks separately (one for each). The same will be submitted on or before the scheduled time.

Course Contents:

Topics	HRS
1. **Compression algorithms**: Information Theory, Huffman/Arithmetic/Gamma Codes, Context Coding/PPM, Lempel Ziv/Gzip/Burrows Wheeler, Graph Compression	5
2. **Linear programming & game development**: Flow problems as Linear programs Simplex, Elipsoid and Interior point methods, Airline crew scheduling, Sudoku, Chess, Candy crush	6
3. **Cryptographic algorithms**: One-way functions, basic protocols, Number theory review: groups, fields, Galois fields, Private key cryptosystems (Block Ciphers, Rijdael), Public key cryptosystems (SSL, RSA, ElGamal, Diffie-Hellman), Kerberos and Digital Cash)	5
4. **Network Algorithms:** Packet forwarding, switch scheduling, traffic shaping, bandwidth partitioning, buffer management and congestion control	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5. **Machine learning algorithms:** Decision Trees, Naive Bayes , Ordinary Least Squares Regression, Logistic Regression, Support Vector Machines	6
6. **Algorithms for Big Data:** MapReduce, Approximate Counting, Count-min Sketch, Random Walks, PageRank	4
7. **Geometry and graphics:** Convexity, triangulation, sweeping, spatial partitioning, Voronoi Diagram, Robot Motion Planning	5
8. **Spectral Algorithms,** Low rank Approximations, Random projections, Graph sparsification, Community detection	5
Total	**42**

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. A project problem is to be taken up and implemented as a continous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Evaluation Components:

Evaluation scheme is designed to promote and test higher level thinking skills through holistic and continuous evaluation and de-emphasis rote learning. Written exams will be designed and conducted as close/open book(s), close/open notes tests. One of the minor tests will be designed and conducted as a take home test and will be based on individual's research and literature survey. Evaluation scheme will have the following components:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	Test-1	15	1 hour.	Syllabus covered upto Test-1
2	Test -2	25	1.5 hours	Syllabus covered upto Test-2
3	Test -3	35	2 hours	Syllabus covered upto Test-3
4.	Tutorials / Assignments,	25	Entire	Assignment (5) - 9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Quizzes, Attendance		Semester	Quizzes (5) -12 Attendance - 4

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	H	H	H	M	M	H	M	M	M	H	L	H	81%
CO-2	H	H	H	M	H	M	H	M	M	H	L	H	77%
CO-3	H	H	H	M	M	H	L	M	H	H	L	H	85%
CO-4	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-5	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-6	H	H	H	M	H	H	M	M	M	H	L	H	85%
Weightage	100%	100%	100%	70%	70%	80%	60%	90%	83 %	84%	70%	100%	100%

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Text Book(s):

1. Algorithms:- S. Dasgupta, C. Papadimitrou, U. Vazirani
2. Network Algorithms:- Robert Tarzan
3. Computational Geometry: Algorithms and Applications:- Mark de Berg
4. Randomized Algorithm: Raghavan

Course Material:

Lecture presentations and assignments will be posted on the student resource from time to time. In addition following additional online/downloadable resources will be useful.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Genetic Counselling

COURSE CODE: 18B1WBT831

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Genetics

Course Objectives:

1. To provide an understanding of the basis of genetic counseling, diagnostic testing and management for a variety of types of disorders and also the ethical and legal considerations.
2. The students will understand the nature of the non-directive counseling process and the need to educate the patient and family to make informed decisions relating to complex genetic situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand basics of genetic counselling, the nature of the directive and non-directive genetic counselling process and to counsel the patients with genetic diseases and help them in decision making.	Familiarity
CO-2	To understandgenetic basis of various diseases (Chromosomal, monogenic and oligogenic disorder).	Assessment
CO-3	To understand gene therapy, its role in genetic disorders and recent developments in gene therapy.	Assessment
CO-4	To understand risk assessment in genetic counseling and ethical issues in genetic counselling.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Genetic Counselling an overview:**Counseling, diagnostic testing and management of genetic disorders.	2
2	**Human chromosomal disorders:** mutations, types of mutations, chromosomal aberrations, quad screen test, Amniocentesis, karyotyping, Down's syndrome, Patau's syndrome, Edward's syndrome, Turner's syndrome, X- chromosome related syndromes.	6
3	**Human allelic diseases (monogenic and oligogenic):** Cystic fybrosis. Glucose-6-phospho dehydrogenase deficiency Bradet- Biedl syndrome and some important autosomal recessive and dominant disorders	6
4	**Muscle disorders:** Duchenne muscular dystrophy, Becker's muscular dystrophy, limb-girdle muscular dystrophies and cardiac muscle disorders.	4
5	**Neurological disorder:** Alzheimer, Hutington, Parkinson, Lewy body dementia and Schizophrenia	4
6	**Genetic basis of neoplastic disorders:** Retinoblastoma, Wilms tumor, Colectral cancer, and Blooms syndrome	6
7	Prenatal Genetic counseling	2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

8	**Gene therapy:** Principles of molecular genetic-based therapies and treatment with recombinant proteins or genetically engineered vaccines The technology of classical gene therapy Gene therapy for inherited disorders Gene therapy for neoplastic disorders The ethics of human gene therapy	7
9	**Genetic counseling risk assessment**	3
10	**Genetic counseling and ethical issues**	2
Total Lectures		42

Suggested Text Book(s):

1. Strachan T and Read AP (2010) Human Molecular Genetics -4, Garland Science, 4th Ed.
2. Pasternak JJ (2005) An introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases. *Hoboken (New Jersey): John Wiley & Sons*, 2nd Ed.
3. Evans C (2006) Genetic Counselling A psychological approach. New York, NY, US: Cambridge, 1St Ed.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Genetic Counseling)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	2	2	2	1	3	2	2	1	3	2.1
CO-2	2	2	3	2	2	1	-	3	2	2	1	3	2
CO-3	2	3	2	2	2	1	-	3	2	3	1	2	2
CO-4	2	3	2	2	2	2	-	3	2	3	1	2	2
Average	2.0	2.75	2.5	2	2	1.5	1	3	2	2.5	1	2.5	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Infectious diseases

COURSE CODE: 18B1WBT632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Microbiology, Immunology

Course Objectives:

1. Learn to define the basic concepts related to infectious diseases, immunology and epidemiology.
2. Able to understand the basic forms, functions, behaviour, and diversity of infectious agents and their interactions with the host
3. Able to analyse the underlying principles of mode of action and resistance towards the agents used to treat infectious diseases

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The students would have knowledge of infectious diseases for practical use in medicine and biotechnology.	Familiarity
CO-2	The students would have in-depth knowledge of basic concepts related to infectious diseases, immunology and epidemiology.	Assessment
CO-3	The students would develop knowledge and understanding of the basic form, function, behavior, and diversity of infectious agents and their interaction with the host.	Assessment
CO-4	The students would develop knowledge and skill about important techniques used to study host –pathogen interactions.	Assessment/Usage
CO-5	The students would have sound knowledge of mode of action and resistance towards the agents used to treat infectious diseases.	Assessment/Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to infectious diseases Infectious and non- infectious diseases, Epidemiology of infectious diseases. Infectious agents, socio economic impact of infectious diseases	6
2	Host response to infections Bacterial, mycobacterial, viral, helminth, fungal	3
3	Biology of infectious agents Morphology, classification, life cycle, pathogenecity, mechanism of replication in bacteria, viruses, protozoa and fungal pathogens	5
4	Pathology of Infectious diseases Pathogenesis, Clinical pathology, Gross pathology, Microscopic pathology.	4
5	Biology of major Infectious diseases HIV/AIDS, Tuberculosis, malaria, dengue, West Nile virus, chikungunya virus, diarrheal diseases, sexually transmitted infections, influenza, viral hepatitis, Ebola	8
6	Diagnostic techniques for infectious diseases Immunohistology, Immunohistochemistry/In situ hybridization, Polymerase chain reaction based methods, Flow Cytometry.	5
7	Antimicrobials against infectious agents Antimicrobial agents, mechanism of action, Antibiotic resistance, various mechanisms of antibiotic resistance	5
8	Emerging infectious diseases and their Social Impact Emergenceof SARS, Zika virus, Ebola and other newly reported diseases along with their Social	

Approved in Academic Council held on 25.10.2018
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	and Scientific Impact.	4
9	Biological Weapons Introduction, Concept and examples	2
Total Lectures	42	

Suggested Text Book(s):

1. Evolution of infectious disease. Ewald PW. Oxford University Press, New York.1994. ISBN 0-19-511139-7.
2. Emerging Infections 1. Scheld WM, Armstrong D and Hughes JM, Editors. ASM Press, Washinton, DC. 1998. ISBN 1-55581-123-3
3. Emerging Infections 2. Scheld WM, Craig WA and Hughes JM, Editors. ASM Press, Washington, DC. 1998. ISBN 1-55581-141-8.
4. Emerging Viruses. Morse SS, Editor. Oxford University Press, New York. 1993. ISBN 0-19-510-484-6.
5. Modern Infectious Disease Epidemiology: Concepts, Methods, Mathematical Models, and Public Health (Statistics for Biology and Health) Kramer; 2010

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Infectious diseases)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	3	3	3	3	3	2	2	1	3	2.6
CO-2	3	3	3	3	3	3	3	3	3	2	-	3	2.9
CO-3	1	3	3	3	1	1	3	3	3	3	-	3	2.5
CO-4	3	1	3	3	3	3	2	1	-	-	3	2	2.4
CO-5	1	2	3	3	-	-	3	3	2	2	2	2	2.3
Average	2	2.4	3	3	2.5	2.5	2.8	2.6	2.5	2.25	2	2.6	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Introduction - 13B1WHS832 International Business Management

International Business and Trade is a complex system and navigating it is a challenging and exciting task. It is an integral part of the World Economic System and no country can survive without getting involved in it. Because of the forces of Globalization we cannot avoid the competition, even if we don't go out some other company from another country may come at our doorstep. Globalization of markets increases global competition and requires enterprises to continuously improve their performance to sustainably survive.

Political/Economic/Social/Technological/Environmental/Legal (PESTEL) conditions are different for different countries and it extremely important not only for managers but also for employees to understand the differences so that they can make an optimal decision.

Engineers substantially contribute to the success of an enterprise provided they understand and follow fundamental international market forces, economic basics and operational business management.
Therefore, one has to have a complete understanding of dynamics of International Business to survive successfully in the long run. The aim of the present course is to develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

13B1WHS832 International Business Management

Course Goal

To develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

Course Objectives

1. Understand different issues of International Business.
2. Analyze how different environment affects the business of a Multi National Companies.
3. Analyze the effect of changing dynamics of international business on Indian Economy.
4. Understand the importance of different theories of explaining international trade and businesses.
5. Understand the role of International Institutions in promoting and stabilizing the international integration.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

6. Design a suitable strategy for international trade, for a firm, depending upon the economic conditions of both home and host countries.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	13B1WHS832	Semester	VIII
Subject Name	International Business Management		
Credits	3	Contact Hours	3
Faculty (Names)	Coordinator(s)		
	Teacher(s) (Alphabetically)		

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction	Introduction and Basic Understandings of World Map	2
2.	Understanding Globalization	Globalization and International Business	3
3.	International Business Environment	a) Socio-Cultural Environment b) Political and Legal Environment c) Economic Environment	6
4.	International Trade and Investment Theories	a) International Trade Theories b) Foreign Exchange Markets c) Foreign Direct Investment d) Regional Economic Integrations	12
5.	Institutional Framework for International Business	a) WTO (GATT) b) The World Bank Group c) International Monetary Fund (IMF) d) UNCTAD e) Indian Institutions	9
6.	International Business Strategy	a) Organization and Strategy of International Business b) Country Evaluation and Selection c) Entry Strategy and Strategic	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •
IQAC

		Alliances (includes Export-Import, Direct Investments and Collaborative Strategies)	
		Total number of Lectures	42

Evaluation Scheme		
S.No.	**Component**	**Weightage**
1.	Test – 1 (1 Hr)	15
2.	Test – 2 (1 Hr 30 mins)	25
3.	Test – 3 (2 Hrs)	35
5.	Internal • Presentation • Class Participation • Attendance	 10 10 5

Recommended Readings	
1.	International Business by Daniels, Radebaugh, Sullivan and Salwan; Pearson **(Text Book)**
2.	International Business by Hill and Jain; TMH.
3.	International Business by Czinkota, Ronkainen and Moffet; Wiley.
4.	International Business by Cherunilam; PHI
5.	International Business by Justin Paul; PHI.
6.	International Business by Rakesh Mohan Joshi; Oxford.
7.	Newspapers, magazines and internet

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • H.P. IQAC

14B1WHS832 International Human Resource Management

Course Goal

This course is designed to introduce students to the nature of managing human resources in multinational firms. It explores the complexities of IHRM and distinguishes international from domestic HR practices. The purpose of the course is provide students with an in-depth understanding of the basic problems inherent in IHRM to either prepare them for further work in the IHRM field or to give them a sound basis to understand the international corporate dimensions of their own careers. This course will help students identify differences in operating a domestic versus an international business and how business practices need to be adapted to operate successfully in foreign markets.

Course Objective:

1 .Students gain insight into and appreciation for the complexities and differences of operating a business in an international context as it applies to HRM.
2. Understand human resource management systems and their main challenges in multinational companies and improve their performance accordingly,
3. Efficiently implement specific IHRM activities in multinational companies,
4. Make better strategic decisions about people in international settings and
5. Design effective IHRM systems and practices for MNCs.
6..The course also facilitates cross-cultural sensitivity, systemic thinking, context screening, and ethical behavior in international setting

Detailed Syllabi

Lecture-wise Breakup

Subject Code	14B1WHS832		**Semester**	2
Subject Name	International Human Resource Management			
Credits	3		**Contact Hours**	3
Faculty (Names)	**Coordinator(s)**	1.Dr. Tanu Sharma		
	Teacher(s) (Alphabetically)			
Module No.	**Subtitle of the Module**		**Topics**	**No. of Lectures**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

Chapter	Topic		Hours
1	**Introduction** **Case** : NCR in Scotland	Defining International HRM Variables that moderate differences between domestic and international HRM Applying a strategic view of IHRM	3
2	**Internationalization of HRM :Socio-Cultural Contexts** **Case:** Oki UK ltd	National Culture and HRM HRM and its broad context National Culture and Specific HRM Issues Business imperatives and Other non – cultural influences on HRM	3
3	**National Context of HRM: case of 7 major economies** **Case** :Litton imports cell manufacturing from Sweden	Major economies and their HRM practices 1.HRM in Japan 2. HRM in the United States 3. HRM in the United Kingdom 4. HRM in Turkey 5. HRM in the Arab Middle East 6. HRM in India 7. HRM in China	5
4	**Staffing International operations for sustained global growth**	Approaches to staffing Transferring staff for international business activities The roles of an expatriate The role of expatriates Return on investment of international assignments The role of the corporate HR function in MNEs	3
5	**Recruiting and selecting staff for international assignments**	Issues in staff selection Factors moderating performance Selection Criteria Dual career couples Are female expatriates different?	3
6	**International training and development** **Case** : Seiko Instruments **Case** : Transfer of Knowledge in Oki-Training and development	The role of expatriate training Components of effective pre-departure training programmes The effectiveness of pre-departure training Developing staff through international	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		assignments Trends in international training and development	
7	**International compensation** **Case** : News International plc	Objectives of international compensation Key components of an international compensation program Approaches to international compensation	3
8	**Re-entry and career issues**	The repatriation process Individual reactions to re-entry Multinational responses Designing a repatriation programme	3
9	**IHRM in the host country context**	Standardization and localization of HRM practices Factors driving standardization Factors driving localization Code of conduct- monitoring HRM practices in the host country Managing human resources in off shoring countrie	4
10	**International industrial relations** **Case :** Elementis and Michelin	Key issues in international relations Trade unions and international industrial relations The response of trade unions to multinationals Regional integration: the European Union	4
11	**Performance Management** **Case :** Tubular Industries Scotland Ltd.	Multinational performance management Performance management of international employees Performance appraisal of international employees	3
12	**IHRM trends: complexity, challenges and choices in the future** **Case :** Orgaon laboratories ltd, scotland	Strategic HRM: research issues and theoretical developments	3

Methodology

The format will emphasize capstone lectures, class discussion of assigned readings and other topics, in-class exercises, case analysis, and a group project.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation :

Exam	Marks
Test 1	15
Test 2	25
Test 3	35
Case study\Assignment\Presentations	25*

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Peter J. Dowling, Marion Festing & Allen D. Engle, SR.:International Human Resource Management (fifth Edition)
2.	D. Briscoe, R. Schuler, & I. Tarique (2012). **International Human Resource Management (4th Edition).** London/New York: Routledge.
3.	Jackson, T.: **International dimensions of human resource management.** London, 2002.
4.	Dessler, G.: **Human Resource Management**. 9th ed., New York, 2003.
5.	Harzing, A. W. & Ruysseveldt, J. (2004). **International human resource management (2th Ed.).** Sage Publication: London.
6.	Briscoe, D. R., Claus , L. M., Schuler , R. S. (2009). **International human resource management: Policies and practices for multinational enterprises.** Routledge

*Break up of internal marks

Internal marks	Total \25		
	Case Study 1	10	T1 /5
	Case Study 2	10	
	Case Study 3	10	T2/5
	Case Study 4	10	
	Case Study 5	10	T3/5
	Case Study 6	10	
	Presentations	10	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Internet Marketing

COURSE CODE: 13B1WHS834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To develop the student's understanding on how the internet has become a necessity in modern business
2. Discover how this medium can assist in marketing. It
3. Examine the fundamental principles associated with the strategic adoption, implementation, use and evaluation of internet in organizations. Essentially, the focus is on
4. Understand how the internet can serve as an invaluable resource for the strategic business and competitive advantage.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the importance of Internet marketing	Familiarity
CO-2	Gain familiarity with fundamental marketing concepts	Assessment
CO-3	Develop Internet marketing mix	Assessment
CO-4	Evaluate modern day internet marketing technology	Usage
CO 5	To understand and decipher elements of electronic service quality and CRM	Assessment

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	**Marketing management Fundamentals:**	Concept, Segmentation, Targeting , Positioning, Marketing mix	4

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
IQAC

2.	**Introduction to Internet marketing** Relevance of the Internet to the modern marketing concept, Internet marketing, E-marketing, E-commerce and E-business, Differences between Internet marketing and traditional marketing. Internet & different marketing functions.	3
3.	**Internet micro and macro environment** Different elements of the Internet environment - competitor, customer and intermediary use of the Internet. Changes in business models enabled by e-commerce .Legal, moral and ethical constraints and opportunities on an organization. Social media marketing	5
4.	**Internet Marketing Mix** Internet marketing strategy to marketing and business strategy ,opportunities and threats arising from the Internet, elements of the marketing mix in an online context, characteristics of an online brand	4
5.	Consumer Behavior Online Changing Patterns of Consumer behaviour,Use of Market segmentation in Consumer Behaviour, Dimensions of Consumerism, Process of Motivation	4
6.	**Interactive marketing communications** Communications characteristics between digital and traditional media, methods for online and offline promotion. Importance of integrating online and offline promotion. methods of measuring site effectiveness	4
7.	**E-service quality** Different stages involved in creating a new site or relaunching an existing site. Design elements that contribute to effective web site content.Factors that are combined to deliver an effective online customer experience.	4
8.	**Customer relationship management** Concepts of relationship direct and database marketing on the Internet, potential of the Internet to support one-to-one marketing and the range of techniques and systems available to support dialogue with the customer over the Internet.	4
	Business-to-business Internet marketing Principal uses of the Internet in business-to-business markets. Impact of Internet technologies on buyer/supplier processes, relationships and markets.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

	Advanced Topics SEO, SEM, TEES, Commercial aspects of Cloud Computing, Big Data & Marketing Intelligence, E-Squal, Digital India	6
Total lectures		**42**

Suggested Text Book(s):

1. E-Marketing 5/E by Judy Strauss and Raymond Frost ©2009 Pearson Education, Inc. Publishing as Prentice Hall
2. Internet Marketing: Strategy, Implementation and Practice, 3/e by Dave Chaffey
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan

Other useful resource(s):

1. http://www.digitalindia.gov.in/
2. http://www.socialbeat.in/2016/07/19/digital-marketing-industry-report-india-2016/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment :10 Class activities :10 Attendance:5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	x	2	x	x	x	x	x	x	x	1	3	1	0.58

Assistant Registrar (Academics)
Jaypee University of Information Technology

IQAC

CO2	x	2	x	x	x	x	1	x	x	x	3	1	0.58
CO3	x	2	3	x	2	x	x	x	3	x	3	1	1.17
CO4	1	2	3	2	2	x	x	x	x	x	3	1	1.17
CO5	x	2	x	x	x	2	1	2	3	1	3	1	1.25
Average	0.20	2.00	1.20	0.40	0.80	0.40	0.40	0.40	1.20	0.40	3.00	1.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Humanities and Social Sciences

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Internet of Things

COURSE CODE: 18B1WCI738

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Programming experience, preferably in MATLAB, and/or C/C++/C#/Python/Java

Course Objectives:

1. Understand the basics of IoT, The various IoT protocols and applications of various IoT technologies.
2. Be familiar with the basics of Contiki OS and standardized protocols for IPv6 Low power networking
3. Know the IEEE 802.15.4 standard and 6 LoWPAN technology
4. Understand the RPL protocol and to understand the various routing Issues in IoT
5. Be exposed to the security issues, data collection and distributed computing

Course outcomes:

S.NO	Course outcomes	Level of Attainment
CO-1	To learn IoT Architecture, Security Concerns, Security challenges and Issues, IoT five layers Security at different layers, The IoT protocols	Familiarity
CO-2	To learn about Contiki Operating System, The Hardware Platforms, IP networking, The standardized protocols for IPv6 Low power networking, The COOJA network simulator.	Familarity
CO-3	To learn The IPv6 packet format, IEEE 802.15.4 standard, IPv6 over IEEE 802.15.4, 6LoWPAN packet format, Addressing, Forwarding and Routing, Header compression, Fragmentation and Reassembly, Multicasting.	Assessment
CO-4	To study the Routing Issues in IoT, The RPL protocol and Distance Vector Routing, Storing and Non-Storing Mode of Operation, RPL control messages (ICMPv6) i.e, DIO-DAO-DIS, The objective function, Loop detection and Repair mechanisms, RPL implementation with COOJA simulator	Assessment
CO-5	To study the various development boards and their interfacing with IoT	Assessment
CO-6	To learn about Security Issues in RPL, Data collection for IoT applications, Distributed Computing in IoT	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Internet-of-Things (IoT)** Introduction to IoT, The IoT Architecture, Security Concerns, Security challenges and Issues, Security at different layers, The IoT protocols	4
2	**Contiki Operating System** The Overview of Contiki Operating System, The Hardware Platforms, IP networking, The standardized protocols for IPv6 Low power networking, The COOJA network simulator	4
3	**IEEE Standards** The IPv6 packet format, IEEE 802.15.4 standard, IPv6 over IEEE 802.15.4, 6LoWPAN packet format, Addressing, Forwarding and Routing, Header compression,	12

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Fragmentation and Reassembly, Multicasting	
4	**Routing** Routing Issues in IoT, The RPL protocol and Distance Vector Routing, Storing and Non-Storing Mode of Operation, RPL control messages (ICMPv6) i.e, DIO-DAO-DIS, The objective function, Loop detection and Repair mechanisms, RPL implementation with COOJA simulator	**12**
5	**Security Issues** Security Issues in RPL, Data collection for IoT applications, Distributed Computing in IoT	**10**
Total Lectures		**42**

Suggested Text Book(s):

i. Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, 1st edition, Springer, 2017.

ii. Building The Internet-of-Things, Maciej Kranz, Wiley, 2016.

Suggested Reference Book(s):

iii. Learning Internet-of-Things, Peter Waher, Packt Publisher, 2015.

iv. IoT in 5 days: an easy guide to Wireless Sensor Networks (WSN), IPv6 and the Internet-of-Things(IoT) , Antonio Linan Colina , Alvaro Vives, Antoine Bagula, Marco Zennaro and Ermanno Pietrose, 2015.

Other useful resource(s):

Link to NPTEL course contents: https://nptel.ac.in/courses/106105166/

Link to topics related to course:

i. https://nptel.ac.in/courses/106105166/1
ii. https://nptel.ac.in/courses/106105166/6
iii. https://nptel.ac.in/courses/106105166//3
iv. https://nptel.ac.in/courses/106105166//10
v. https://nptel.ac.in/courses/106105166//12
vi. https://nptel.ac.in/courses/106105166//15
vii. https://nptel.ac.in/courses/106105166/21
viii. https://nptel.ac.in/courses/106105166//29

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 hr.	Syllabus covered up to Test- 1.
2	T-2	25	1.5 hr.	Syllabus covered up to Test- 2.
3	T-3	35	2 hr.	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

S.No	Internet of Things	Level of Attainment	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	Weightage
1	The Internet of Things: • Introduction • The Basic Concepts • Interaction with the Internet • Major components if IoT devices • Control Units • Sensors • Communication Modules • Power Sources • Communication Technologies • RFID • Bluetooth • ZigBee • WiFi • RF Links • Mobile Internet • Wired Communication • Which one is the best? • Current Status and the Near Future	Familiarity	H	M	M	L	M	H	H	M	L	H	73%
2	The Basics of Sensors and Actuators: • How Sensors Work • Analog Sensors • Digital Sensors • Pull-Up/Down resistors and Sensors • A brief Introduction to sampling theory • A/D conversion • Examples of sensors and working principles • Acceleration • Temperature • Humidity • Distance • Light • Orientation • Sound	Familiarity	H	H	H	L	L	H	H	H	M	H	84%

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	• Electric Current • Actuators • Relay Switch • Servo Motor • Putting Things Together												
3	An Introduction to Cloud Computing: • Some History • Cloud Computing Components • Cloud Computing Models and Architectures • Benefits of Cloud Computing • Communicating with the Cloud using Web Services • SOAP and RESTful Web Services • SOAP • REST • Cloud Computing and IoT • Most popular Open Cloud Computing Services for Sensor Management • The Pachube service for Internet of Things • The Nimbits Data logging Cloud Server • Thing Speak Internet of Things • The iDigi Device Cloud • The SensorCloud	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
4	The Arduino Microcontroller Platform: • Microcontrollers • Programming Microcontrollers • The Arduino Platform • The Boards • The Anatomy of an Arduino Board • The Development Environment • Setup the IDE • Writing Arduino Software • The Arduino Sketch • Some Basic Examples • Trying your code on an Arduino Emulator • Extending Arduino • The Arduino Libraries • Programming your Arduino for the Internet of Things • Using Timers • Using Threads • Adding Security to your Sensor Readings • Authenticating your Arduino	Technical skills	H	H	H	M	M	M	H	M	M	M	80%

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
IQAC
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	• Encrypting your Data												
5	Reading From Sensors: • Sensing the World • Reading from Analog Sensors • Digital Sensors • Sensors With On/Off Sates • Using the Serial Protocol • The Software Serial Library • Using the I2C Protocol • Communicating with a Digital Pressure Sensor • Talking I2C through The Code • Read Data From Another Arduino Board • The SPI Protocol	Technical skills	H	H	H	M	M	M	M	M	L	H	73%
6	Talking to your Android phone with Arduino: • Connecting Arduino with a mobile device • The Android mobile OS • Communicating using Bluetooth • Hardware • Configure your Bluetooth serial modem • Software • Project 1- Send Air Quality data to your phone • Communicating using USB • Using the Google ADK • Using the ADB • Hardware • Project 2 – Tweet Sensor readings through your phone • Project 3 – Control a relay switch by texting your phone	Technical skills	H	H	H	H	M	H	H	M	M	H	92%
7	Connecting Your Arduino to The Internet: • The Basics of the Internet • TCP/IP • IP/MAC Addresses • DNS and DHCP • Network Sockets • HTTP • Connect your Arduino using the Ethernet • What you will need • The Arduino Ethernet Library • A Simple Ethernet Client Example • A Simple Ethernet Server Example	Assessment	H	H	H	H	M	H	H	M	M	M	88%

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	• Connect your Arduino using the WiFi • What you will need • The WiShield Library • The WiFly Shield Library • Connect your Arduino using a GSM Network • Other Ways to 'Internetize' your Arduino • Using your PC as an Internet Gateway • The Java – Processing Code • Using the Arduino Library for Processing • The Publish/Subscribe Notion • Web Sockets • The MQTT protocol • Send Arduino Data to your own Cloud Application • Project Description • The Google App Engine • Building a J2EE Web App for Google App Engine • Using the Ethernet Shield												
8	Introducing Cosm As A Cloud Service: •	Assessment	H	H	H	M	M	H	H	H	M	H	92%
9	Introducing The Nimbits Public Cloud Server: •	Assessment	H	H	H	H	M	H	H	H	M	M	85%
10	Reprogram Your Arduino Remotely From The Cloud: •	Technical skills	H	H	H	M	M	M	H	M	M	M	80%
11	What One Can Connect to the Cloud: Project Ideas: •	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
12	Internet of Things with Intel Galileo: •	Assessment	H	H	H	H	M	H	H	M	M	M	88%
13	Mini computers for IoT: •	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
	TOTAL		100%	98%	98%	64%	64%	92%	90%	82%	61%	80%	

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

List of Programme Outcomes (PO) for CSE

PO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

PO-2: An ability to apply knowledge of mathematics, science, and engineering to real-life problems.

PO-3: Ability to model, understand, and develop complex software and information management systems.

PO-4: An ability to function effectively within teams.

PO-5: An understanding of professional and ethical responsibility.

PO-6: An ability to communicate effectively, both in writing and oral.

PO-7: The broad education necessary to understand the impact of Computer Science and Engineering solutions in the societal and human context.

PO-8: A recognition of the need for, and an ability to engage in life-long learning.

PO-9: A knowledge of contemporary issues.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

List of POs for IT

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals;

PO-2: Acquire in-depth technical competence in a specific Information Technology discipline;

PO-3: Ability to undertake problem identification, formulation and solution;

PO-4: Ability to utilize systems approach to design and evaluate operational performance;

PO-5: Understanding of the principles of design for sustainable development;

PO-6: Understanding of professional and ethical responsibilities and commitment to them;

PO-7: Ability to communicate effectively, not only with engineers but also with the community at large

PO-8: Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;

PO-9: Understanding of the social, cultural, global and environmental responsibilities of a professional engineer;

PO-10: Recognizing the need to undertake life-long learning, and possessing/acquiring the capacity to do so.

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Linear Programming and Applications

COURSE CODE: 10B1WMA832

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Provide students with the basic mathematical concepts of linear programming problems
2. Provide student to formulate the LPP and conceptualize the feasible region.
3. Solve the LPP with two variables using graphical and simplex method.
4. Provide students to analyze the sensitivity of a decision variable.
5. Understand the concept of an objective function, a feasible region, and a solution set of an optimization problem.
6. Write down the dual linear programming problem.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand basic terms and Solve linear programming problems by graphical method.	Familiarity
CO-2	Solve linear programming problems by simplex, big M and Two phase methods.	Assessment
CO-3	Understand duality and dual simplex method.	Familiarity
CO-4	Understand assignment problem and method for solving it.	Familiarity
CO-5	Understand transportation model and finding solution of transportation problem.	Familiarity
CO-6	Solve Integer programming problems by different methods.	Usage
CO-7	Solving sequencing problems.	Usage
CO-8	Understand game theory, CPM and PERT.	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Linear Programming Problems (LPP):** Definition of LPP, Mathematical formulations of LP Models, Graphical Solutions of Linear Programming Problems (LPP)	4
2	**Linear Programming Problems (LPP):** Simplex Method, Artificial Variable Method, Two Phase Method, Charnes' Big-M Method	5
3	**Linear Programming Problems (LPP):** Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method	5
4	**Assignment Problems :** Definition, Hungarian Method for AP	4
5	**Transportation Problems :** Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method. Techniques for Obtaining Optimal Basic Feasible Solution	12
6	**Integer Linear Programming Problems :** Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method	5
7	**Sequencing Problem**: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, 2 Jobs and m machines problems	3
8	**Game Theory**: Concept of game; Two-person zero-sum game; Pure and Mixed Strategy Games; Saddle point,Odds Method; Dominance Method and Graphical Method for solving Mixed Strategy Game. CPM and PERT- network diagram-Events and activities- project planning reducing critical events and activities-critical path calculations	4
Total lectures		42

Suggested Text Book(s):

1. Taha,H.A.: Operations Research- An Introduction, Macmillan, New York 1992.
2. Sharma S.D.: Operations Research, Kedar Nath Ram Nath, 2003.

Suggested Reference Book(s):

1. Hadley, G.: Linear Programming, Massachusetts, Addison-Wesley, 1962.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2. Hiller, F.S. and Lieberman, G.J.: Introduction to Operations Research, Holden-Day, San Francisco 1995.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/111102012/
   https://nptel.ac.in/courses/109103021/

2. Link to topics related to course:
   i. https://nptel.ac.in/courses/111104027/
   ii. https://nptel.ac.in/courses/111102012/29
   iii. https://nptel.ac.in/courses/111102012/27

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (1) - 5 Quizzes (1) - 15 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	0	1	0	1	0	1	0	1	1	1.08
CO-2	3	3	2	0	1	0	0	0	1	0	1	0	0.92
CO-3	3	3	2	0	1	0	0	0	1	0	1	0	0.92
CO-4	3	2	1	1	1	0	1	0	1	0	1	1	1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-5	3	2	1	1	1	0	0	0	2	0	1	1	**1**
CO-6	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
CO-7	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
CO-8	3	3	2	0	1	0	0	0	0	0	1	1	**0.92**
Average	**3**	**2.75**	**1.75**	**0.25**	**1**	**0**	**0.25**	**0**	**0.75**	**0**	**1**	**0.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Mathematics

IQAC

COURSE DESCRIPTION

Course Name:	Mobile and Distributed Computing
Course Code:	17BWCI811
Course Credits:	3-0-0 (L-P-T)
Branch and Semester:	B. Tech (CSE), VIII Sem
Session:	January – June, 2018
Faculty Coordinators:	Dr. Ruchi Verma

Objective: The objective of this course is

- To introduce fundamentals and basic techniques of distributed and mobile computing.
- To make the student understand the concept various system model of distributed computing, communication.
- To make the student understand the concept networking and internetworking of the distributed computing.
- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.

S.NO	Course outcomes (Mobile and Distributed Computing) (17BWCI811)	Level of Attainment
CO-1	To understand the basic concept and skills of distributed computing.	Familiarity
CO-2	To gain in depth knowledge of the various system model and internetworking concepts of distributed computing.	Familiarity
CO-3	To understand & develop any existing or new protocol related to mobile environment	Usage
CO-4	To develop an understanding of the MAC issues of mobile computing environment and its solution.	Assessment
CO-5	To develop distributed applications using latest technologies.	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents/Lecture Plan:

S.No.	Chapter	Lectures	Chapter
1.	**DISTRIBUTED COMPUTING** Introduction to Distributed Computing, Evolution, Characteristics, Design Issues, User Requirements Distributed Computing Models-Workstation Model Workstation-Server Model, Processor–Pool Model	4	Book 1-2 1 2 3 4
2.	**SYSTEM MODELS & COMMUNICATION** Client Server Communication, Group Communication IPC - Message Passing, Features RPC – Model, Implementation, Stub Generation RPC Messages, Communication Protocols, Marshaling Distributed Shared Memory – Architecture, Design Issues, Thrashing, Replacement Strategy Synchronization – Clock Synchronization, Event Ordering, Mutual Exclusion	7	Book 1-2 1 2 3 4-5 6 7
3.	**NETWORKING & INTERNETWORKING** Types of networks, Network principles Internet protocols Case studies: Ethernet WiFi Bluetooth ATM	6	Book 1-2 1 2 3 4 5 6
4.	**MOBILE COMPUTING-INTRODUCTION** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications Impediments and Architecture Mobile and Handheld Devices, Limitations of Mobile andHandheld Devices GSM – Services, System Architecture Radio Interfaces, Protocols Localization, Calling Handover, Security	8	Book 3 1 2 3 4 5 6 7 8
5.	**WIRELESS MEDIUM ACCESS CONTROL** Motivation for a specialized MAC, Hidden and Exposed terminals Near and Far terminals SDMA, FDMA TDMA, CDMA Wireless LAN **MOBILE NETWORK LAYER**	9	Book 3 1 2 3 4 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	IP and Mobile IP Network Layers Packet Delivery and Handover Management, LocationManagement Registration, Tunneling and Encapsulation Route Optimization, DHCP		6 7 8 9
6.	**MOBILE TRANSPORT LAYER** Conventional TCP/IP Protocols Indirect TCP, Snooping TCP Mobile TCP Other Transport Layer Protocols for Mobile Networks **DATABASE ISSUES** Database Hoarding & Caching Techniques Client-Server Computing & Adaptation Transactional Models Query processing Data Recovery Process &QoS Issues	8	Book 3 1 2 3 4 5 6 7 7 8
	Total	**42**	

Maintenance of Records:

The students are expected to write all the assignments in a copy. The assignments are pasted in the Students Resource as the semester proceeds. Separate problems are taken up with the students in the tutorial classes.

Teaching and Learning Strategies:

The subject is first introduced to the student explaining its background, necessity, purpose of study and future implementation. All core concepts are taught in class lectures and applied questions are taken up in tutorial classes. Each concept is taught maintaining a connection with the predecessor and successor topics. This helps the students understand the subject in a complete manner which enables them in implementation of the concepts.

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	Test -1	15	1 hr.	Syllabus covered upto T- 1
2	Test -2	25	1 hr 30 min.	Syllabus covered upto T- 2
3	Test - 3	35	2 hours	Full Syllabus
4	Tutorials / Assignments, Quizzes,	25	Entire Semester	Tutorials / Assignment - 9 Quizzes -10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Attendance			Attendance - 6

Textbook:

1: Jean Dollimore, Tim Kindberg, George Coulouris, Distributed Systems: Concepts and Design, 4th Edition, Addison Wesley.
2: George Coulouris , Jean Dellimore and Tim Kindberg, Distributed Systems- Concepts and designing, PHI
3: Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition

Reference Books:

1. Stojmenovic, Handbook of Wireless Networks and Mobile Computing. Hoboken, NJ: John Wiley & Sons, 2002.
2. Stalling, William, 2002. Wireless Communications and Networks. 2nd ed. Upper Saddle River, NJ 07458: Pearson

A. Course Material:

- Lecture presentations and assignments will be posted on the student resource from time to time.
- Notes are also made by the faculty and posted on Student Resource on various topics to help students understand the topic better

- In addition online/downloadable resources will also be useful.

Sr No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO-1	H	M	M	L	M	H	H	M	L	L	L	H	79%
CO-2	H	H	H	M	L	L	M	H	M	L	L	H	73%
CO-3	H	H	M	M	M	L	M	M	M	L	L	M	70%
CO-4	H	H	H	H	M	L	M	H	M	L	L	M	64%
CO-5	H	H	H	H	M	L	M	H	M	L	L	H	67%
	90%	78%	76%	72%	68%	64%	72%	76%	68%	60%	60%	72%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis
PO-3	Design/development of solutions
PO-4	Conduct investigations of complex problems
PO-5	Modern tool usage
PO-6	The engineer and society
PO-7	Environment and sustainability
PO-8	Ethics
PO-9	Individual and team work
PO-10	Communication
PO-11	Project management and finance
PO-12	Life-long learning

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Nano-Biotechnology

COURSE CODE: 18B1WBT633

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic of Physics, Chemistry and Biology

Course Objectives:

1. Introduction to Nanomaterial and various material used for obtaining nano-materials
2. Learn various approaches or methods used for nanomaterial synthesis.
3. To learn various analytical techniques used for nanomaterial characterization.
4. Learn various applications of nanomaterial in health care, agriculture and environmental monitoring

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduction to Nano (Basics to Nanoscience and Nanotechnology)	Familiarity
CO-2	Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterial and fundamental properties of Nano-materials(Nano-effect)	Assessment & Technical
CO-3	Introduction to various technique used for the characterization of nanostructures and nanomaterial.	Assessment & Technical
CO-4	Fundamental understanding of nanomaterial/nano-biotechnological application in health and disease.	Usage
CO-5	Fundamental understanding of nanomaterial/nano-biotechnological application in Environment and food - detection and mitigation	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction, History &Applications:**Various definitions and Concept of Nano-biotechnology & Historical background. Fundamental sciences and broad areas of Nano-biotechnology. Various applications of Nano- biotechnology, Cell – Nanostructure interactions	6
2	**Synthetic methodologies:**Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterials: Lithography method, Electrochemical method, Mechanical Method, Chemical Synthesis, Chemical vapour deposition, Molecular self-assembly, Laser Induced assembly.	10
3	**Techniques used for the characterization of nanoparticles:**Principles of microscopy-light, electron, fluorescent confocal, scanning and transmission microscopes, different fixation and staining techniques for	13
	EM. Principles of spectroscopy-UV, visible, CD, FTIR, NMR, and ESR spectroscopy, structure determination using X-ray diffraction, analysis using light scattering.	
4	**Nano-biotechnologicalapplications in health and disease:**Properties of different types of nanoparticles normally used in health and disease. Diagnostics and theranostics application of nanomaterials in health sciences.	6
	Nanobiotechnological applications in Environment andfood - detection and mitigation: Properties of different types of nanoparticles normally used in	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

5	environmental and food sciences. Detection and removal of toxic metal ion from polluted sample and detection and removal of pathogen form food sample.	7
Total Lectures		**42**

Suggested Text Book(s):

1. C. A. Mirkin and C. M. Niemeyer. Nanobiotechnology - II more concepts and applications. (2007) - Wiley VCH.
2. P. Boisseau, P. Houdy, M. Lahmani, Nanoscience: Nanobiotechnology and Nanobiology

Suggested Reference Book(s):

1. A. Nouailhat, An Introduction to Nanoscience and Nanotechnology, Wiley
2. D.A Phoenix, W. Ahmed, Nanobiotechnology, One Central Press Ltd, UK
3. L. Filipponi, D. Sutherland, Nanotechnologies: Principles, Applications, Implications and Hands-on Activities.Directorate- European commission

Other useful resource(s): Link to NPTEL course contents

- https://nptel.ac.in/courses/118107015/
- https://onlinecourses.nptel.ac.in/noc17_bt17/preview
- http://videos.gitam.edu/nptel/nano.html

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Course Outcomes (COs) contribution to the programme Outcomes (POs):

Course outcomes (NanoBiotech.)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	1	2	3	2	1	1	1	2	2	1.7
CO-2	2	3	2	2	3	2	2	2	1	1	3	2	2.1
CO-3	3	3	2	2	3	2	2	2	1	1	3	2	2.2
CO-4	2	2	3	3	2	3	2	2	2	2	3	2	2.3
CO-5	2	2	3	3	2	3	3	2	2	1	3	2	2.3
Average	2.2	2.4	2.2	2.2	2.4	2.6	2.2	1.8	1.4	1.2	2.8	2.0	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

11B1WCI836: Network Management

Course Credit: 3
Semester: VIII

Introduction

Network Management is becoming more and more important to Government and commercial organizations to run their IT networks in an efficient and cost effective manner. The emerging Internet based applications, such as Voice Over IP (Internet Telephony) and IP TV (Internet based TV service) and technologies such as wireless communications and so forth make network management all the more important. This course will provide an understanding of the concept, standards, products and practical methods pertaining to network management and will be helpful to students and researchers working in the field of network management.

Network management (NM) refers to all the functions, facilities, tools, communications interfaces, protocols, and human resources necessary to monitor and maintain data and communications networks and plan for their growth and evolution. NM includes investigation of day-to-day operations and administration of the networks. Within this framework, various aspects of managing voice and data networks are covered in this course. The course also covers the concepts and fundamentals of NM standards such as OSI management standards and Simple Network Management Protocol (SNMP), which is a de facto standard.

Course Objectives (Post-conditions)

Knowledge objectives:

The objective of this course is to study network management (NM) from a software developers perspective and to provide an understanding of SNMP and OSI NM standards and technologies. This course covers various aspects of NM, including NM functions, facilities, equipment, communications protocols, processes and methodologies. It also covers products and technologies that are used to manage practical networks.

By the end of this course, students will be able to:

1. Demonstrate an understanding of network management concepts, standards, and protocols including Simple Network Management Protocol (SNMP) and Open Systems Interconnection (OSI) protocols.
2. Show how to apply network management standards to manage practical networks.
3. Discuss issues and challenges pertaining to management of emerging network technologies such as wireless networks and high-speed internets, and learn approaches to manage them.
4. Demonstrate in-depth understanding of various aspects of network management and be able to design and develope an automated NM tool.

Application objectives:

1. Apply appropriate known cryptographic techniques for a given scenario. [Usage]
2. You will be able to analyze the tradeoffs of balancing key security properties.[Usage]
3 You will be able to design a security solution and do the cryptanalysis. .[Usage]

Expected Student Background (Preconditions)

Computer Network .

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC

Topics Outline:

S NO	Topics	Hrs
1	Data Communications and Network Management Overview	3
2	Review of Computer Network Technology	4
3	Basic Foundations of Network management, standards, models and languages, ASN.1	3
4	SNMP v1 Organisation and Information models	4
5	SNMP v1 Communication and functional Models	4
6	SNMP v2	4
7	SNMP v3	4
8	SNMP management RMON	4
9	Network Management Tools and systems and Engineeriong	2
10	Telecommunications Management Networks	2
11	Network Management applications	2
12	Broadband Network Management: WAN ATM Networks	2
13	Broadband Network Management: Access Networks	3
14	Advanced Topics:Web Based Network Management	1
	Total	42

References

1. Mani Subramanian., Pearson Education, Network Management Principles and Practices
2. https://www.dmoz.org//Computers/Internet/Protocols/SNMP
3. http://www.snmp.com/conferences/
4. http://tools.ietf.org/html/rfc3411
5. http://tools.ietf.org/html/rfc6353
6. http://www.artechhouse.com/uploads/public/documents/chapters/pan-ch04.pdf

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	9 marks (3x3)
Quizzes	12 marks (3x4)
Regularity	4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

OPTICAL COMMUNICATION SYSTEMS

(Elective Subject)

Course Code:	11B1WEC834	Semester:	8th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. To introduce the concept of optical fiber communication system.
2. To make the students to know the constituents of the fiber optics communication system and optoelectronics.
3. To know the applications of fiber optics systems.

Course Outcomes

After studying this course the students would gain enough knowledge

1. Understand basics of optical communication systems.
2. The principles that govern optical communication systems.
3. Behavior of light as electromagnetic waves in different types of fibers.
4. The hardware components required to implement optical communication systems.
5. To efficiently design an optical communication system for practical purpose.
6. The practical techniques involved in optical communication systems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Fiber optics and Optoelectronics, Historical developments, Fiber optic communication system, Advantages, Emergence as a key technology, Role of Fiber optics technology.	Text Book 1, Chapter 1, Pages 1-16; Text Book 2, Chapter 1, Pages 1-11	3
2.	Ray Propagation in Optical Fibers - Introduction, review of fundamental laws of optics, Ray propagation in Step-index and Graded-index Fibers, Effect of material dispersion, The combined effect of multipath and material dispersion, Calculation of rms pulse width.	Text Book 1, Chapter 2, Pages 17-35 Text Book 2, Chapter 1, Pages 1-11	6
3	Wave propagation in Planar Waveguides- Introduction, Maxwell's equations, Solution in a inhomogeneous medium, Planar optical waveguide, TE modes of a symmetric step-index planar waveguide, Power distribution and	Text Book 1, Chapter 3, Pages 37-57;	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	confinement factor.		
4	Wave propagation in Cylindrical Waveguides- Introduction, Modal analysis of an ideal SI optical fiber, fractional modal power distribution, Graded-index fibers, Limitations of multimode fibers.	Text Book 2, Chapter 4, Pages 1-61-80	4
5	Single-mode Fibers- Introduction, Single-mode fibers, Characteristics parameters of SMFs, Dispersion in SMFs, Attenuation in SMFs.	Text Book 1, Chapter 5, Pages 83-105;	4
6	Optoelectronic Sources - Introduction, Fundamental aspects of semiconductor physics, the p-n junction, Current densities and injection efficiency, Injection luminescence and the LED, the heterojunction, LED designs, Modulation response of an LED, Injection laser diodes, Source-fiber coupling	Text Book 1, Chapter 7, Pages 147-199; Text Book 2, Chapter 15	3
7	Optoelectronic Detectors - Introduction, The basic principle of optoelectronic detection. Types of photodiodes, Photoconducting detectors, Noise considerations.	Text Book 1, Chapter 8, Pages 200-218	5
8	Optoelectronic Modulators - Introduction, Review of basic principles, Electro-optic modulators, Accousto-optic modulators, Application areas of optoelectronic modulators	Text Book 1, Chapter 9, Pages 219-246;	4
9	Optical Amplifiers - Introduction, Semiconductor optical amplifiers, Erbium-doped fiber amplifiers, Fiber Raman amplifiers, Application areas of optical amplifiers	Pages 247-272; Text Book 2, Chapter, Pages	5
10	Wavelength-division Multiplexing - Introduction, The concepts of WDM and DWDM, Passive components, Active components.	Text Book 1, Chapter 11, Pages 248-23;	3
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

- 10 Marks : Class performance, Tutorials & Assignments
- 10 Marks : Quizzes
- 5 marks : Attendance

Text Books

1. Fiber Optics and Optoelectronics, R.P. Khare Oxford University Press.
2. Fiber Optic Communication Systems, G. P. Agarwal, Third Edition, Wiley.

Reference Books

1. Optical Communication- principles and practice, John M Senior, Third edition, Pearson India.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

11B1WCI834: Parallel Processing

Course Credit: 3
Semester: VIII

Introduction

Parallel programming developed as a means of improving performance and efficiency in a parallel program, the processing is broken up into parts, each of which can be executed concurrently. The instructions from each part run simultaneously on different CPUs. These CPUs can exist on a single machine, or they can be CPUs in a set of computers connected via a network. Parallel programming is an efficient form of information processing which emphasizes the exploitation of concurrent events in the computing process. The objective of the subject is to provide the knowledge and basic applications of parallel processing concepts, parallel environments and architectures, parallel algorithms and parallel programming. The format of the course will be lecture-discussions, assignments. Students are strongly encouraged to participate actively in class discussions.

Course Objectives (Post-conditions)
Knowledge objectives:
At the conclusion of the course, following learning objectives are expected to be achieved:

1. Describe different parallel processing architectures based on relationships between processing elements, instruction sequence, memory and interconnected network
2. Identify algorithms, which require parallelization as part of system design or performance enhancement
3. Classify shared and distributed memory parallel systems according to their properties and usage models
4. Design and develop parallel algorithms for shared and distributed memory models
5. Evaluate the performance of parallel algorithms designed based on shared and distributed memory models as well as against serial based algorithm designs

Application objectives:

The homework portions of the course are intended to help you apply your understanding,

1. Ability to acquire and apply fundamental principles of science and engineering
2. Ability to apply parallel programming constructs to make software execution parallel
3. Ability to think about different phenomenon in nature for their occurrence in parallel.

Expected Student Background (Preconditions)

Students are expected to have a solid grasp of the fundamentals of computer system, including a basic understanding of the operation of the computer, especially CPU. In addition, students are expected to know application development environment and programming concepts. Assembly

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

programming ability will be helpful, as we will be looking to understand architecture of contemporary computers.

Topics Outline:

S NO	Topics	Hrs
1	Parallel computer architecture, principles of scalable performance and multiprocessors architecture.Parallel Computer Models: The state of computing, Multiprocessors and multicomputer, Multi vector and SIMD computers, PRAM and VLSI Models, Architectural Development tracks	6
2	Network Properties ,Conditions of parallelism, program partition and scheduling ,Program Flow Mechanisms, System Interconnect Architecture, Interconnected networks.	6
3	Principles of scalable Performance, performance Metrics and Measures, Parallel processing Applications , Speedup Performances Laws, Scalability and approaches	6
4	Basic concepts of pipelining, Arithmetic pipelines, Instruction pipelines Hazards in a pipeline: structural, data, and control hazards Overview of hazard resolution techniques, Dynamic instruction scheduling Branch prediction techniques, and Instruction-level parallelism using software approaches.	6
5	Main memories, Cache memory design and implementation, Virtual memory design and implementation, Secondary memory technology, RAID	6
6	Centralized vs. distributed shared memory ,Interconnection topologies, Multiprocessor architecture, Multiprocessor system interconnects, cache coherence and synchronization Mechanism, Three generations of Multicomputer, Message Passage Mechanism using OPEN MP and MPI	6
7	Parallel Processing with GPU (CUDA), Processor Architecture, Interconnect, Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: IBM CELL BE, Nvidia Tesla GPU), Memory hierarchy and transaction specific memory design, Thread Organization	6
	Total	42

References

1. Parallel Programming in C with MPI and OpenMP by M J Quinn
2. Advanced Computer Architecture, Parallelism, Scalability, Programmability, Kai Hwang, Mc Graw Hill International Editions, Computer Science Series.
3. Parallel Programming in OpenMP , by Rohit Chandra (Author), Leo Dagum (Author), Dror Maydan
4. Introduction to Parallel Computing by Ananth Grama, George Karypis, Vipin Kumar, and Anshul Gupta.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

1.	Mid Term Exam (Viva and Written Exam)	20
2.	End term Exam (Viva and Written Exam)	30
3.	Lab Records	5
4.	Regular Assessment (Quality and quantity of experiment performed, Learning laboratory skills, Attendance etc.)	30
5.	Project	15
	Total	**100**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE DESCRIPTION

Course Name: Service Oriented Architecture

Course Code: 13B1WCI831

Course Credits: 3

Branch and Semester: B Tech CSE and IT – 8th Semester

Session: January - June, 2017

Course Coordinator: Dr. P.K. Gupta

Course Objectives:

- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design

Course Contents:

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Basics	Basics of Software Engineering and	3
	Architecture	Software Architecture	5
2	Unit I	Roots of SOA–Characteristics of SOA-Comparing SOA to client-server and distributed internet architectures–Anatomy of SOA-How components in an SOA interrelate-Principles of service orientation	6
3	Unit II	Web services–Service descriptions–Messaging with SOAP–Message exchange Patterns–Coordination–Atomic Transactions–Business activities–Orchestration–Choreography-Service layer abstraction–Application Service Layer–Business ServiceLayer–Orchestration Service Layer	6
4	Unit III	Service oriented analysis–Business-centric SOA–Deriving business services-service modeling-Service Oriented Design–WSDL basics–SOAP basics–SOA composition guidelines–Entity-centric business service design–Application service design–Task-centric business service	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

		design	
5	Unit IV	SOA platform basics–SOA support in J2EE–Java API for XML-based web services (JAX-WS)-Java architecture for XML binding (JAXB)–Java API for XML Registries (JAXR)-Java API for XML based RPC (JAX-RPC)-Web Services Interoperability Technologies (WSIT)-SOA supportin .NET–Common Language Runtime-ASP.NETweb forms–ASP.NETweb services–Web Services Enhancements (WSE)	8
6	Unit V	WS-BPEL basics–WS-Coordination overview-WS-Choreography, WS-Policy, WS-Security.	6
Total number of Lectures			**40**

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	Test 1 (T1)	15	1 hr.	Syllabus covered up to T1 Test
2	Test 2 (T2)	25	1.30 hr.	Mainly syllabus covered after T1 Test, plus some questions from portions covered up to T1 Test.
3	Test3 (T3)	35	2 hr.	Mainly syllabus covered after T1 and T2 Test, plus some questions from portions covered up to T1 & T2 Test.
4	Assignments/ Quizzes/Home work/Regularity in Attendance	25	Entire Semester	5 + 10 + 5 + 5 = 25 M arks.
Total =	**100**			

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

References:

1. Applied SOA: *service-oriented architecture* and design strategies / Mike Rosen (2008) (***ebook***)
2. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
3. Newcomer, "Understanding SOA with Web Services", Pearson Education, 2005.
4. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
5. Dan Woods and Thomas Mattern, " Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

SOFT COMPUTING TECHNIQUES

(Elective Subject)

Course Code:	13B1WEC831	Semester:	8th Semester, B. Tech (ECE), M.Tech(Ist year)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes

Upon completion of the course, the student are expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to fuzzy set theory: Probabilistic reasoning, Fuzzy sets, mathematics of fuzzy set theory, operations on fuzzy sets, comparision of fuzzy and crisp set theory.	Ross Ch 1,2 Sivanandam Ch 7,8	4
2.	Fuzzy mapping: one to one mapping, max-min principle, extension principle, implication rules – mamdani implications. Membership functions: Universe of discourse, mapping inside fuzzy domain, fuzzy membership mapping methods, and application to real world problems.	Ross Ch 2,3 Sivanandam Ch 9,10	10
3	Artificial Neural Networks (ANN) and their biological roots and motivations. Comparison	Sivanandam Ch1,2	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Between Artificial and Biological Neural Networks, Applications of Neural network. Network Architecture ,Taxonomy of neural networks: feed forward and recurrent networks with. Merits and limitations of neurocomputing.	Haykin Ch1,2	
4	Types of learning, supervised and unsupervised learning laws . Learnig Laws : Hebb's rule, Delta rule, Widrow - Hoff (The Least-Mean-Square) learning rule, correlation learning rule, instar and outstar learning rules, Competitive learning, Credit Assignment Problem, Error Correction learning, Memory based learning, , Boltzmann learning.	Sivanandam Ch 3 Haykin Ch 3,4	10
5	The Perceptron and its learning law, Classification of linearly separable patterns, Multi-Layer Perceptron, Supervised Learning, Back-Propagation Learning law. Feed forward networks, Recurrent Networks.	Sivanandam Ch 3 Haykin Ch 4	6
6	Winner takes-all Networks, Competitive Learning, Kohonen's Self organizing Maps, Introduction to Adaptive Resonance Theory.	Sivanandam Ch 5	4
		Total Number of Lectures	44

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance &Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1.Simon Haykin, "*ArtificialNeutral Networks*".
2. Yegna Narayanan, *"Artificial Neural Networks"*.
3. Timothy J. Ross, " *Fuzzy Logic with Engineering Applications*".
4. S.N.Sivanandam, S.N Deepa, "*Principles of Soft Computing*"

Reference Books

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Bart Kosko, "Neural Network and Fuzzy Systems: A Dynamic System Approach to Machine" Prentice-Hall 1998
2. L. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications", Prentice-Hall, 1994
3. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002.

ONLINE MATERIAL

http://nptel.ac.in/courses/117105084/

http://nptel.ac.in/courses/108104049/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

11B1WCI835: Storage Networks

Course Credit: 3
Semester: VIII

Introduction

This course involves study of various aspects of storage networks which include the design model SAN, NAS, DAS, CAS, etc. and the various technologies like SCSI, Fiber Channel, INFINIBAND, IP Storage etc.. The format of the course will be lecture-discussions, assignments. Students are strongly encouraged to participate actively in class discussions.

Course Objectives (Post-conditions)

Knowledge objectives:

To strengthen the ability to design and implement the various aspects of storage networks which include the design model SAN, NAS, DAS, CAS, etc. and the various technologies like SCSI, Fibre Channel, INFINIBAND, IP Stoarge etc.

Students will be able to:

- Know About various components and protocols used for creating storage networks.
- Know about various technologies existing for storage networks
- About Storage virtualization.
- Existing techniques for management of storage networks

About Data Centers and Distributed Storage Networks

Application objectives:

1. To develop, design and implement SAN Architecture.
2. To understand use of FCSAN, IPSAN protocols and RAID levels.
3. To understand and simulate the File system and virtualization algorithms.
4. To understand and simulate the Hadoop Distributed file system.

Expected Student Background (Preconditions)

Students should have basic knowledge about the functioning of various components of computer system.

Topics Outline:

S NO	Topics	Hrs
1	**Intorduction to Storage Technology** Data proliferartion Overview of storage infrastructure components Evolution of storage Information Lifecycle Management concept Basic storage management skills and activities	2
2	**Technologies for Storage Networks** Disk Subsystems Overview	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Architecture of Intelligent Disk Subsytem JBOD: Just A Bunch Of Disks RAID & RAID Levels Hot Sparing Hard Disks and Internal I/O Channels Caching: Acceleration of Hard Disk Access	
3	**I/O Techniques** DAS, SAN, NAS, evolution, Storage Area Networks (SAN): elements & connectivity Fibre Channel SAN & Products IP SAN Technology & Products IP SAN elements, standards (iSCSI, iFCP, mFCP, FCIP and iSNS) Migration from SCSI and Fibre Channel to IP storage Network attached Storage: elements & connectivity	18
4	**Management of Storage Network:** Requirements of Management Systems Management Interfaces Standardized and Proprietary Mechanisms In-band & Out-band Management	6
5	Storage Virtualization The concept of storage virtualization Storage virtualization on various levels of the storage network Symmetric & Asymmetric Storage virtualization Performance of SAN virtualization Scaling storage with virtualization	6
	Total	42

References

1. Storage Networks Explained, Ulf Troppens, Rainer Erkens,ISBN 0-470-86182-7, John Wiley& Sons
2. Storage Networks: The Complete Reference, R. Spalding, ISBN:0072224762, McGraw-Hill
3. Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems,Applications, Management, and Filing Systems, Marc Farley, ISBN: 1-58705-162-1, Cisco Press.
4. Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs, Second Edition", Tom Clark, ISBN: 0-321-13650-0, Addison Wesley

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	9 marks (3x3)
Quizzes	12 marks (3x4)
Regularity	4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

STRATEGIC MANAGEMENT

Course code: 11B1WPD832 (3-0-0)
Course Credits: 3 (3-0-0)
Semester: VIII
Course Type: Elective (Offered to all B.Tech students)
Department: Humanities and Social Sciences

Objective:
To learn the dynamics of the business world and use this knowledge to take better long term decisions.

Learning Outcomes:

1. Understand the difference between operational management and strategic management.
2. Understand the special skill set required to take strategic decisions.
3. Analyse the environment of an organisation and be able to chart the future outlook.
4. Define the internal strengths and weaknesses of an organisation in light of the environment it is facing.
5. Understand the strategic alternatives available to a company w.r.t. its SWOT.
6. Learn to select the most appropriate strategic alternative.
7. Understand the difference between developing a strategy and putting it into action.
8. Understand the processes that must be put in place so that successful strategic management is practiced at all times.

Course outline

S. No.	Topics	Learning Outcomes	Hours
1.	Defining strategy and strategic management: An overview of strategic management and business policy. (Ch: 1, pp. 2- 35)	• Understand the difference between operational and strategic management • Understand the significance of strategic management for any organisation	3
2.	The General Environment: • Scanning, Monitoring and Forecasting changes in the Environment • Scenario planning • PEST analysis • SWOT analysis • General and Competitive analysis	• Understand the significance of identifying signals of change in the environment • Be able to use PEST, SWOT and scenario planning to understand the environmental influences on an organisation	4
3.	The competitive environment:	• Be able to explain any industry on the	4

IQAC
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	• Introduction • Porter's Five forces model • The value net • Strategic Groups • Hypercompetition	basis of Porter's five forces model • Understand the limitations of this model • Understand the use of strategic groups and value net to understand the competitive environment	
4.	The Internal Environment- Value creating activities: • Value chain analysis • SWOT analysis	• Understand the concept of value chain • Use value chain analysis to define the unique capabilities of an organisation	3
5.	The Internal Environment- Resource based view: • The Resource Based view • Identifying sustainable competitive advantage • Knowledge Management	• Understand that strategy must evolve from the internal strength of an organisation • Understand the creation and maintainence of uniqueness in an organisation	3
6.	Assessing Organisational Performance: • Defining performance metrics • Financial Analysis • Balanced Scorecard • Benchmarking	• Understand and be able to use common performance parmeters to evaluate strategic success in an organisation	2
7.	Business Level Strategy: • Defining Business Level Strategy • Generic strategies • Resource based view • Industry Life cycle approach • Strategy and market turbulence	• Understand the difference between corporate level and business level strategies • Be able to use the different frameworks to devise strategy	5
8.	Corporate Level Strategy • Growth strategies • Diversification-related and unrelated • Implementing growth strategies • Portfolio analysis • Corporate parenting • Strategic Evaluation	• Understand the different alternatives to strategy • Understand how to choose the appropriate alternative	6
9.	International Strategy and Globalisation • Globalisation • Types of international strategy	• Understand the importance of globalisation • Understand the way a company can	4

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	• Entry mode strategies • Porter's Diamond of Competitive advantage	pursue a successful international strategy • Understand that conditions in the home market create constant innovation capabilities in organisations	
10.	Organisational systems and strategy implementation • Organisational structures • Organisational Processes • Strategic Control Systems • Strategic Change	• Understand how different structures can enable or hinder strategy implementation • Learn the significance of organisational Processes to strategy implementation	3
11.	Leadership and strategy implementation • Leadership and management • The learning organisation • Emotional Intelligence and Leadership • Narcissistic Leadership • Leadership-vision, values and culture • Leading strategic Change • Chaos and Innovation	• Understand the impact of leadership on effective strategy implementation	3

Methodology
The course will be taught with the aid of lectures and case studies.

Evaluation Scheme

Total Marks 100	
Mid sem 40 marks	End Sem 60 Marks

Text Book
Understanding Strategic Management: Anthony Henry, Oxford University Press.

Books for Reference
1. Strategic Management and Business Policy: Azhar Kazmi, Tata Mc Graw Hill.
2. Exploring Corporate Strategy: Gerry Johnson and Kevan Scholes, Pearson Education.

Web Reference:

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

3.	Indian Culture, tradition and societal norms	• Rajiv Malhotra's "Indian Comfort with Chaos" and "Western Joker and Indian Clown" from *Being Different: An Indian Challenge to Western Universalism*	8
4.	Views on Education, Indian ethos, identity and rural development	• S. Radhakrishnan's "The Adaptive Culture" and "Of One Mind" from *The Adaptive Indian: Identity and Ethos*	4
6.	Partition Literature: Migration and Identity	• Jhumpa Lahiri's "The Triangle", "The Second Exile" and "The Wall" from *In Other Words* • Ismat Chugtai's *Roots*	8
7.	Bhakti Radicals and Dalit Literature: Human Rights in India against caste system	• The Bhakti Radicals and Untouchability by Gail Omvedt from *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India* • Introduction to Dalit Movement; *Karukku* by Bama	3
		Total number of Lectures	42

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism.* Harper Collins: Noida, 2013
2.	Radhakrishnan, S. *The Adaptive Indian: Identity and Ethos.* Orient Paperbacks: New Delhi, 2013
3.	Lahiri, Jhumpa. *In Other Words.* Penguin: New Delhi, 2017
4.	Bhagavan, Manu and Anne Feldhaus.Eds. *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India.* OUP: New Delhi, 2008.
5.	Asaduddin, M. *Ismat Chugtai: Lifting the Viel.* Modern Classics. Penguin: New Delhi, 2009

Evalution Scheme:

S.No.	Exam	Marks	Duration	Coverage/ Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire	Assignment -6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

UNDERSTANDING INIDA: LITERARY REFLECTIONS

COURSE CODE: 18B1WHS636

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite : None

Course Objectives:

1. To understand migration and its impact on individuals.
2. To recognize the impact of displacement on individuals.
3. To explore social, economic, cultural and geographical contexts and its relevance for a holistic living.
4. To look for roots and connections in literature with focus on environment and peace in society.
5. To access the impact of gender on migration.
6. To define identity and what it means in the modern context.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
1	Analyze the reason and impact of migration and displacement	Familiarity
2	Explore and understand the socio-cultural and geographical contexts for a holistic living	Assessment
3	Demonstrate familiarity with gender issues	Assessment
4	Understanding the links and connections in construction of identity	Usage
5	Apprise the students with socio-cultural concepts and historical events like Dalit literature, Bhakti Radicals and Partition literature respectively	Familiarity

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Modern Literature	• Cross-cultural Reflections in Vinay Rai's "A Rainbow of Contradictions" and "The Multitasking Indian" from *Think India*	3
2.	From other Margins (Regional environment/ecology, traditions, folklores)	• Mamang Dai's "Sorrow of Women" and "An Obscure Place" • Sanjoy Hazarika's "There are No Shangri-Las Left"	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT

- http://global.oup.com/uk/orc/busecon/business/henry2e/
- https://www.wiziq.com/tests/strategic-management
- http://strategyclub.com/students

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •
IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

			Semester	Group Discussions -6 Presentations -8 Class Assessment -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Understanding India: Literary Reflections)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	2	1	3	3	2	2	2	3	2.0
CO-2	1	3	3	3	3	1	1	3	2	2	1	3	2.1
CO-3	1	2	2	2	3	2	2	3	2	2	1	3	2.0
CO-4	1	3	3	3	2	3	3	3	2	3	2	3	2.5
CO-5	1	3	3	3	2	3	3	3	2	3	1	3	2.5
Average	1	2.6	2.6	2.6	2.4	2	2.4	3	2	2.4	1.4	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

COURSE DESCRIPTION

Course Name:	Wireless Sensor Networks: Protocols and Applications
Course Code:	15B1WCI831
Course Credits:	3 (3-0-0)
Branch and Semester:	2nd Semester [ECE, CSE, IT, BI]
Session:	Jan – Jun, 2016
Faculty Coordinators:	Dr. Yashwant Singh

Description & Rationale:

Wide range of applications such as disaster management, military and security have fuelled the interest in sensor networks during the past few years. Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. Such constraints make the design and operation of sensor networks considerably different from contemporary wireless networks, and necessitate the development of resource conscious protocols and management techniques. This course provides a broad coverage of challenges and latest research results related to the design and management of wireless sensor networks. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration, fault-tolerance, and network security.

Learning Outcome:

By the completion of the course, you should be able to:

- Architect sensor networks for various application setups.
- Explore the design space and conduct trade-off analysis between performance and resources.
- Assess coverage and conduct node deployment planning.
- Devise appropriate data dissemination protocols and model links cost.
- Determine suitable medium access protocols and radio hardware.
- Prototype sensor networks using commercial components.
- Provision quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints.
- Evaluate the performance of sensor networks and identify bottlenecks.
- Explore Security, routing Protocol and information Fusion in WSN.

Maintenance of Records:

Students are expected to keep records of labwork and homework assignments (to be posted on students resource from time to time) neatly in suitable hard bound notebooks separately (one for each). The same will be submitted to the TA in the Lab on or before the scheduled time.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. These are further explored and expanded through a series of practical-based sessions. A project problem is to be taken up and implemented as a continuous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study and practical work. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Pre-requisites:

- Introduction to Computer Networks

Tools and Technologies:

C / C++ , Java, NS-2, Matlab etc.

Evaluation Components:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	Test-1	15	1 hour.	Syllabus covered upto Test-1
2	Test -2	25	1.5 hours	Syllabus covered upto Test-2
3	Test -3	45	2 hours	Syllabus covered upto Test-3
3.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (5) - 9 Quizzes (5) -12 Attendance - 4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Structures Group: Dr. Yashwant Singh, Dr. Hemrj Saini, Dr. Ravindara Bhatt

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Wireless Sensor Networks: Protocols and Applications (15B1WCI831)) IT	Level of Attainment	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	Weightage
1. To architect WSN for various application setups	Familiarity	H	H	H	M	M	H	H	H	M	M	87%
2. To explore the design space and conduct trade-off analysis between performance and resources.	Familiarity	H	H	H	M	M	H	H	H	M	H	90%
3. To assess coverage and conduct node deployment planning.	Usage	H	H	H	M	M	H	M	H	M	H	87%
4. To devise appropriate data dissemination protocols and model links cost.	Usage	H	H	H	M	M	H	H	M	H	H	90%
5. To determine suitable medium access protocols and radio hardware.	Usage	H	H	H	M	H	M	H	M	M	M	83%
6. To create prototype wireless sensor networks using simulator.	Assessment	H	H	H	H	M	H	H	M	M	M	87%
7. To provision quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints.	Assessment	H	H	H	M	M	H	H	H	H	M	90%
8. To evaluate the performance of sensor networks and identify bottlenecks.	Assessment	H	H	H	H	M	H	H	H	M	H	93%
9. To Explore Security node clone attack, opportunistic routing Protocol and information Fusion in WSN.	Assessment	H	H	H	M	M	H	H	H	M	M	87%
Weightage		100%	100%	100%	74%	70%	96%	96%	89%	74%	82%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Contents:

S.No.	Topics	Hrs.
1	Introduction to WSN, Applications of WSN, Challenges for WSN, Why Sensor Networks different, Enabling technologies for WSN	3
2	Architectures: Single Node Architectures, Hardware Components, Energy Consumption of Sensor node, operating System and execution environment.	3
3	Network Architectures: Sensor networks Scenario, Optimization Goals and figures of merits, Design Principles of WSN, Service interface of WSN.	3
4	Communication Protocol: Physical Layer introduction. Wireless Channel and communication fundamentals, physical layer and transeceiver design consideration in WSN	3
5	MAC Protocols: Fundamental of MAC protocols, Low duty cycle protocols, Contention based protocol, schedule based protocols, IEEE802.15.4 MAC Protocol.	4
6	Link Layer Protocols: Fundamentals, Tasks and requirements, Error control, Framing, Link Management.	3
7	Naming and Addressing: Fundamentals, Address and name management in WSN, Assignment of MAC addresses	3
8	Time Synchronization: Introduction, protocol based on sender/receiver synchronization	3
9	Localization and Positioning: properties of localization and positioning problems, single hop localization, multihop localization, etc.	3
10	Topology Control: Motibvation and basic idea, power control, clustering etc.	3
11	Routing Protocol: Energy efficient, unicast, broadcast, Opportunistic routing etc.	3
12	Data centric and content based networking: data centric routing, Data Aggregation, data centric storage.	3
13	Transport layer and QoS: Coverage and deployment, reliable data Transport, packet delivery, block delivery.	3
14	Advanced topics	2
	Total	**42**

Text Book(s):

T1: **Protocols and Architectures for Wireless Sensor Networks**
Holger Karl, Technical University of Berlin
Andreas Willig, University of Potsdam
Wiley, ISBN: 0-470-09510-5, June 2005
T2: **Wireless Sensor Networks**
Cauligi S. Raghavendra, University of Southern California
Krishna Sivalingam, University of Maryland Baltimore County
Taieb M. Znati, University of Pittsburg

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Springer, ISBN: 1-4020-7883-8, August 2005

Reading Assignments (Tentative)

1. Y. Sun, O. Gurewitz, and D. B. Johnson, " RI-MAC: a receiver-initiated asynchronous duty cycle MAC protocol for dynamic traffic loads in wireless sensor networks ," in the *Proceedings of the 6th ACM Conference on Embedded Network Sensor Systems (SenSys'08)*, Raleigh, NC, November 2008.
2. M. Sha, G. Xing, G. Zhou, S. Liu, and X. Wang " C-MAC: Model-driven Concurrent Medium Access Control for Wireless Sensor Networks ," in the *Proceedings of the 28th IEEE Conference on Computer Communications (INFOCOM 2009)*, Rio de Janeiro, Brazil, April 2009.
3. O. Farrag, M. Younis and, W. D'Amico " MAC Support for Wireless Multimedia Sensor Networks ," in the *Proceedings of the IEEE Global Communications Conference (GLOBECOM 2009)*, Honolulu, Hawaii, November 2009.
4. I. Rhee, A. Warrier, M. Aia, J. Min, " Z-MAC: a hybrid MAC for wireless sensor networks ," in the *Proceedings of the 3rd ACM Conference on Embedded Networked Sensor Systems (Sensys 2005)*, November 2005.
5. G. Jolly and M. Younis, " An Energy Efficient, Scalable and Collision less MAC layer Protocol for Wireless Sensor Networks ," *Journal of Wireless Communications and Mobile Computing*, Vol. 5, No. 3, pp. 285-304, May 2005.
6. A. A. Syed, W. Ye, and J. Heidemann, " Comparison and Evaluation of the T-Lohi MAC for Underwater Acoustic Sensor Networks ," *IEEE Journal of Selected Areas in Communication*, Vol. *26*, No. 12, pp. 1731-1743, December 2008.
7. O. Younis and S. Fahmy, " Distributed Clustering in Ad-Hoc Sensor Networks: A Hybrid, Energy-Efficient Approach ," in the *Proceedings of the 23rd INFOCOM 2004*, Volume 1, 7-11 March 2004.
8. M. Youssef, A. Youssef, M. Younis, " Overlapping Multihop Clustering for Wireless Sensor Networks ," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 20, No. 12, pp.1844-1856, Dec. 2009.
9. C.-Y. Chen and C. Wen, " Distributed clustering with directional antennas for wireless sensor networks ," *IEEE Sensors Journal*, Vol. 13, No. 6, pp.2166–2180, 2013.
10. Z. Zhou, J.-H. Cui and S. Zhou, " Efficient Localization for large scale underwater sensor network ," *Journal of Ad-Hoc Networks*, Vol. 8, No. 3, pp. 267-279, May 2009.
11. M. Youssef, M. Mah, and A. Agrawala, " Challenges: Device-free Passive Localization for Wireless Environments ," in the*Proceedings of the 13th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'07)*, Montreal, QC, Canda, September 2007.
12. S. Lederer, Y. Wang, and J. Gao, " Connectivity-Based Localization of Large Scale Sensor Networks with Complex Shape ," in the*Proceedings of the 27th IEEE Conference on Computer Communications (INFOCOM 2008)*, Phoenix, AZ, April 2008.
13. Y. Xu, J. Heidemann, and D. Estrin, " Geography-informed energy conservation for ad hoc routing ," in the *Proceedings of the 7th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'01)*, Rome, Italy, July 2001.
14. C. Intanagonwiwat, R. Govindan, and D. Estrin, " Directed Diffusion: A Scalable and Robust Communication Paradigm for Sensor Networks ," *in the Proceedings of the Sixth Annual International Conference on Mobile Computing and Networks (MobiCom'00)*, August 2000.
15. H. Kim, T. Abdelzaher, and W. Kwon, " Minimum-energy asynchronous dissemination to mobile sinks in wireless sensor networks ," in the *Proceedings of the 1st ACM conference on Embedded networked sensor systems (Synsys'03)*, Los Angeles, CA, November 2003.
16. U. Lee, et al., " Pressure Routing for Underwater Sensor Networks ," in the *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March. 2010.
17. Y. Yu, D. Estrin, and R. Govindan, " Geographical and Energy-Aware Routing: A Recursive Data Dissemination Protocol for Wireless Sensor Networks ," *UCLA Computer Science Department Technical Report, UCLA-CSD TR-01-0023*, May 2001.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

18. T. He et al., " SPEED: A stateless protocol for real-time communication in sensor networks ," in the *Proceedings of International Conference on Distributed Computing Systems*, Providence, RI, May 2003.
19. V. Shnayder, M.Hempstead, B. Chen, G. W. Allen, and M. Welsh, " Simulating the Power Consumption of Large-scale Sensor Network Applications ," in the *Proceedings of the 2nd International Conference on Embedded Networked Sensor Systems (SenSys'04)*, Baltimore, MD, November 2004.
20. N. Ramanathan, K. Chang, R. Kapur, L. Girod, E. Kohler, and D. Estrin, " Sympathy for the Sensor Network Debugger ," in the *Proceedings of the 3rd International Conference on Embedded Networked Sensor Systems (SenSys'05)*, San Diego, California, November 2005.
21. L. Girod, J. Elson, A. Cerpa, T. Stathopoulos, N. Ramanathan, and D. Estrin, " EmStar: a software environment for developing and deploying wireless sensor networks ," in the *Proceedings of the USENIX Annual Technical Conference (ATEC'04)*, Berkeley, California, 2004.
22. Y. T. Hou, Y. Shi, H. D. Sherali and S. F. Midkiff, " Prolonging Sensor Network Lifetime with Energy Provisioning and Relay Node Placement ," in the *Proceedings of the 2nd Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks*, Santa Clara, California, September 2005.
23. R. Falcon, X. Li and A. Nayak, " Carrier-based Focused Coverage Formation in Wireless Sensor and Robot Networks ," *IEEE Transactions on Automatic Control*, Vol. 56 No. 10, pp. 2406 – 2417, 2011.
24. G. Wang, G. Cao, and T. La Porta, " Movement-Assisted Sensor Deployment ," in the *Proceedings of 23rd IEEE INFOCOM*, Hong Kong, March 2004.
25. S. Lee and M. Younis, " EQAR: Effective QoS-Aware Relay Node Placement Algorithm for Connecting Disjoint Wireless Sensor Sub-networks ," *IEEE Transactions on Computers*, Vol. 60, No 12, pp. 1772-1778, November 2011.
26. A. Abbas and M. Younis, " Establishing Connectivity among Disjoint Terminals Using a Mix of Stationary and Mobile Relays Computer Communications ," *Computer Communications*, Vol. 36, pp. 1411–1421, 2013.
27. A. Abbasi, M. Younis, and U. Baroudi, " Restoring Connectivity in Wireless Sensor-Actor Networks with Minimal Topology Changes ," *IEEE Transactions on Vehicular Technology*, Vol. 62, No. 1, pp. 256-271, January 2013.
28. A. Perrig, R. Szewczyk, V. Wen, D. Culler, and J.D. Tygar, " SPINS: Security Protocols for Sensor Networks ," in the *Proceedings of 7th Annual International Conference on Mobile Computing and Networks (MOBICOM 2001)*, Rome, Italy, July 2001.
29. S. Zhu, S. Setia, and S. Jajodia, " LEAP: Efficient Security Mechanisms for Large-Scale Distributed Sensor Networks ," in the *Proceedings of the 10th ACM Conference on Computer and Communications Security (CCS '03)*, Washington D.C., October, 2003.
30. M. Younis, K. Ghumman and M. Eltoweissy, " Key Management in Wireless Ad Hoc Networks: Collusion Analysis and Prevention ," in the *Proceedings of the 24th IEEE International Performance, Computing, and Communications Conference (IPCCC'05)*, Phoenix, Arizona, April 2005.
31. M. Younis, O. Farrag, and B. Althouse, " TAM: A Tiered Authentication of Multicast Protocol for Ad-Hoc Networks ," *IEEE Transactions on Network and Service Management*, Vol. 9, No. 1, pp. 100-113, March 2012.
32. Y. Li and J. Ren " Source-Location Privacy through Dynamic Routing in Wireless Sensor Networks ," in the *Proceedings of IEEE INFOCOM 2010*, San Diego, California, March 2010.
33. Z. Ren, and M. Younis, " Exploiting Architectural Techniques for Boosting Base-station Anonymity of Wireless Sensor Networks ," *International Journal of Sensor Networks*, Vol.11, No.4, pp.215 – 227, 2012.

Interesting Articles

- Overview & Technical insight:
- F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E.Cayirci, "Wireless sensor networks: a survey," *Computer Networks*, Vol. 38, No. 4, pp. 393—422, 2002.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

☐ D. Culler, D. Estrin and M. Srivastava, "Overview of Sensor Networks," *IEEE Computer Magazine*, August 2004.
☐ Chee-Yee Chong; Kumar, S.P., "Sensor networks: Evolution, opportunities, and challenges," *Proceedings of the IEEE*, August 2003.
☐ J. A. Stankovic, T. Abdelzaher, C. Lu, L. Sha, J. Hou, "Real-Time Communication and Coordination in Embedded Sensor Networks," *Proceedings of the IEEE*, Vol. 91, No. 7, pp. 1002-1022, July 2003.
☐ Deborah Estrin, David Culler, and Kris Pister, "Connecting the Physical World with Pervasive Networks," *IEEE Pervasive Computing*, Vol. 1, No.1 January-March 2002.
☐ S. Tilak, N. B. Abu-Ghazaleh, and W. Heinzelman, "A taxonomy of wireless microsensor network models," *ACM Mobile Computing and Communication Review (MC2R)*, Vol. 6, No. 2, pp. 1-8, 2002.
☐ L. Schwiebert, S. Gupta and J. Weinmann, "Research Challenges in Wireless Networks of Biomedical Sensors," *ACM Mobicomm 2001*, pp. 151-165, 2001.
☐ J.M. Kahn, R. Katz, K. Pister, "Emerging Challenges: Mobile Networking for "Smart Dust," *J. Communications and Networks*, Vol. 2, No. 3, Sept. 2000.
☐ G. J. Pottie and W. J. Kaiser, "Wireless integrated network sensors," *Communications of the ACM*, Vol. 43, No. 5, pp. 51-58, 2000.
☐ D. Estrin, R. Govindan, J. Heidemann, and S. Kumar, "Next century challenges: Scalable coordination in sensor networks," in: *Proceedings of the 5th IEEE/ACM Annual Conference on Mobile Computing and Networks (MobiCOM'99)*, Seattle, WA, August 1999.
☐ http://www.extremetech.com/article2/0,1697,1744363,00.asp
☐ http://www.eetimes.com/story/OEG20030221S0018
☐ Underwater Sensor Networks: http://www.ece.gatech.edu/research/labs/bwn/UWASN/publication.html

☐ Applications and Experiments:
☐ Jeongyeup Paek and Krishna Chintalapudi and John Cafferey and Ramesh Govindan and Sami Masri, "A Wireless Sensor Network for Structural Health Monitoring: Performance and Experience," in the*Proceedings of the Second IEEE Workshop on Embedded Networked Sensors (EmNetS-II)*, Syndney, Australia, May 2005.
☐ K. Martinez, J. Hart and R. Ong, "Environmental Sensor Networks," *IEEE Computer Magazine*, August 2004.
☐ S. Brennan, A. Mielke, D. Torney and A. Maccabe, "Radiation Detection With Distributed Sensor Networks," *IEEE Computer Magazine*, August 2004.
☐ M. Maroti, G. Simon, A Ledeczi and J. Sztipanovits, "Shooter Localization in Urban Terrain," *IEEE Computer Magazine*, August 2004.
☐ R. Szewczyk, A. Mainwaring, J. Polastre and D. Culler, "An Analysis of a Large Scale Habitat Monitoring Application," *Proceedings of ACM SenSys*, November 2004.
☐ K. Mechitov, W. Kim, G. Agha, and T. Nagayama, "High-Frequency Distributed Sensing for Structure Monitoring," *Proceedings of the First International Conference on Networked Sensing Systems*, Tokyo, Japan, June 2004.
☐ A.Mainwaring, R. Szewczyk, D. Culler, J. Anderson "Wireless Sensor Networks for Habitat Monitoring" *Proceedings of the ACM International Workshop on Wireless Sensor Networks and Applications (WSNA)*, 2002.
☐ Security:
☐ A. Perrig, J. Stankovic, D. Wagner, "Security in Wireless Sensor Networks," *Communications of the ACM*, June 2004.
☐ D. Carman, P. Kruus, and B. Matt, "Constraints and Approaches for Distributed Sensor Networks Security," *NAI Technical Report #00-010*, Sep. 2000.
☐ C. Karlof and D. Wagner, "Secure Routing in Wireless Sensor Networks: Attacks and Countermeasures," *Elsevier's AdHoc Networks Journal, Special Issue on Sensor Network Applications and Protocols*, vol. 1, pp 293-315, 2003.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

A. Woods and J. A. "Stankovic, Denial of Service Attacks in Sensor Networks," *IEEE Computer*, October 2002, pp. 54-62.

Class Project Topics

Interesting Research Links

- ANRG Sensor Networks Bibliography
- Networked & Embedded Systems Laboratory (NESL) at UCLA
- Intel Research Labs: Sensor Nets / RFID
- National Institute of Standard and Technology
- Sensor body network
- Sensor networks research group

A. Course Material:

Lecture presentations, assignments and practicals, will be posted on the student resource from time to time. In addition following additional online/downloadable resources will be useful.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Programme Outcomes :

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.
PO-2: Acquire in-depth technical competence in a specific information technology discipline.
PO-3: Ability to undertake problem identification, formulation and providing optimum solution .
PO-4: Ability to utilize systems approach to design and evaluate operational performance.
PO-5: Understanding of the principles of inter-disciplinary domains for sustainable development.
PO-6: Understanding of professional & ethical responsibilities and commitment to them.
PO-7: Ability to communicate effectively, not only with engineers but also with the community at large.
PO-8: Ability to function effectively as an individual and in a group with the capacity to be a team leader.
PO-9: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.
PO-10: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Advanced Concrete Technology

COURSE CODE: 10B13CE744

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Concrete Technology

Course Objectives:

1. To prepare the graduates as best civil engineers with an excellent comprehension of fundamentals of concrete structure at micro and macro levels and applications of different types of cement and concretes.
2. To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.
3. Study and understand the procedure of mix design for production of ultra-high strength concrete by the use of particle packing concepts.
4. To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete
5. To understand the fundamentals of self-compacting concrete and its testing for different properties.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To study the basic fundamentals, classifications and applications of polymer concrete, fiber reinforced concrete.	Familiarity
CO-2	To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.	Assessment
CO-3	Study and Understand the procedure of mix design for production of ultra high strength concrete by the use of particle packing concepts.	Assessment
CO-4	To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete.	Usage
CO-5	To understand the basic fundamentals of self compacting concrete and its testing for different properties.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction to polymer concrete- its classification and applications.	14
2	**Ultra high strength concrete:** basic fundamentals. Types, application and production.	4
3	**Mix design of Polymer concrete and UHPC:** Introduction of particle packing concept, optimization of granular mixture and how to design for a mixture to increase the homogeneity of the mixture.	8
4	**Self compacting concrete:** Mix design, testing, production and application.	4
5	**Mineral and chemical admixtures**: Optimization and selection of a particular type of mineral and chemical admixture.	12
Total lectures		42

Suggested Text Book(s):

1. A.M.Neville, -Properties of Concretel, English Language Book Society/Longman Pub, 1988
2. P.K.Mehta and J.M.M.Paulo, —Concrete – Microstructure – Properties and Materiall, ICI, Indian First Edition, Reprint1999.

Suggested Reference Book(s):

1. Zonghjin Li, —Advanced Concrete Technology, John Wiley & Sons, INC, Newjersy,2011l.
2. A.R. Santhakumar, —Concrete Technologyl, Oxford University press, New Delhi,2009.
3. N.Krishna Raju, —Design of Concrete Mixl, CBS Pub.,1985.
4. Taylor, H. W. F., _Cement Chemistry,' Academic Press, Inc., San Diego, CA,1990.
5. Lea, F. M., _The Chemistry of Cement and Concrete,' Chemical Publishing Company, Inc., New York, 1971.
6. Mindess, S., and Young, J. F., _Concrete,' Prentice Hall, Inc., NJ, 1981. J. Newman and B. S. Choo,Eds., _Advanced Concrete Technology', Four Volume Set, Elsevier, 2003

Other useful resource(s):

1. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_ce21/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Advanced Concrete Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	2	1	1	3	1	1	2	2	3	3	**1.92**
CO-2	1	2	3	2	2	1	2	3	3	1	3	2	**2.08**
CO-3	3	3	3	2	1	1	2	3	2	2	3	2	**2.25**
CO-4	3	2	1	3	1	2	3	3	2	3	3	2	**2.33**
CO-5	2	3	3	3	1	3	1	2	2	3	3	2	**2.33**
Average	**2.4**	**2.2**	**2.4**	**2.2**	**1.2**	**2**	**1.8**	**2.4**	**2.2**	**2.2**	**3**	**2.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Java Programming

COURSE CODE: 18B1WCI534

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Object-Oriented Systems and Programming

Course Objectives:

1. Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications
4. Designing distributed applications using Remote Method Invocation (RMI)

Course Outcomes:

S. No	Course Outcomes	Level of Attainment
CO-1	To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings	Usage
CO-2	To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.	Usage
CO-3	To learn the server side programming using Servlets and JSP.	Usage
CO-4	To learn the invocation of the remote methods in an application using RMI	Usage

Course Contents:

Unit	Contents	Lectures required
1	Applet Programming: Structure and Life Cycle of a Java Applet, Graphics, Multithreading and Animation, Abstract Windowing Toolkit, Swings and Event Handling.	8
2	Java Database Connectivity (JDBC): JDBC Product, Types of Drivers, Two- Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface.	6
3	Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP. Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page, JSP with Java Bean.	10
4	Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application.	4
Total Lectures		**28**

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2. Advanced Java Programming by Uttam K. Roy, Publisher: Oxford University Press

Suggested Reference Book(s):

1. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media

Other useful resource(s):

1 Link to NPTEL course contents:

i. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

ii. https://nptel.ac.in/courses/106105084/28

2 Link to topics related to course:

i. https://www.javatpoint.com/

ii. https://www.tutorialspoint.com/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Java Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	1	2	2	3	1	3	1	3	2.2
CO-2	3	3	2	2	1	2	1	3	2	2	3	3	2.3
CO-3	3	3	2	3	3	3	1	3	2	3	3	2	2.6
CO-4	3	3	2	3	3	3	1	3	2	3	3	2	2.6
Average	3	3	2	2.5	2	2.5	1.3	3	1.8	2.8	2.5	2.5	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 28 July 2021

IQAC

Air and Noise Pollution and Control

COURSE CODE: 10B13CE742

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn history of air pollution, definition of air pollution, and source and classification of air pollution.
2. Learn the effects of air pollutants on human health, vegetation and materials and major control devices to control air pollution problems.
3. Learn dispersion phenomenon of air pollutants covering diffusion and advection, meteorological components, stability of atmosphere and corresponding plume shapes.
4. Learn an overview of noise pollution including methods for prevention, control, measures and management of the pollution.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn the air pollution issues and characterize the elements of air pollution.	Familiarity
CO-2	Solve and design complex problems related to dispersion and air quality modeling.	Assessment
CO-3	Apply relevant techniques and methods for control, and prevention of air pollution	Assessment
CO-4	Develop an overview understanding of the strategies, regulations and policies to manage air and noise pollution.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** The earth's atmosphere: structure and composition.	3
2	**Definition and Elements:** Air pollution: definitions: types of pollutants, sources; effect of air pollution on health, environment and materials; air pollution episodes.	5
3	**Meteorology:** Air pollution meteorology: atmospheric circulation patterns, atmospheric stability and vertical mixing, lapse rate and	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	temperature inversions.	
4	**Dispersion Modelling:** Atmospheric dispersions modelling: atmospheric stability classes, Gaussian model, estimation of downwind concentrations, plume rise, tall stacks, and critical wind speed.	8
5	**Control of Particulate Matters:** Control of particulate Matter: characteristics of particles drag force, impaction, interception and diffusion. Cyclones, Electrostatic precipitators, Fabric filter, Particulate scrubbers, spray-chambers, cyclone spray chambers, orifice and wet-impingement scrubbers, venturi and venture-jet scrubbers.	6
6	**Control of Gaseous Emissions:** Control of gaseous emissions: gas-liquid and gas solid equilibrium, solubility, absorption, and kinetics. Gas absorption: physical and chemical absorption, isotherms, and absorption potentials.	6
7	**Legislation and Regulations:** Air Pollution Control Act, National Environmental Policy Act, Ambient Air Quality Standards.	4
8	**Noise Pollution:** Noise pollution definition, prevention and control measures, management of pollution.	4
Total lectures		42

Suggested Text Book(s):

1. H.S. Peavy, D.R. Row and G. Tchobanoglous, Environmental Engineering, Mc Graw Hill International Edition.
2. Air Pollution, M. N. Rao and H.V.N. Rao, Tata Mc Graw Hill.
3. Wark, K., & Warner, C. F. (1981). Air pollution: its origin and control.

Suggested Reference Book(s):

1. Atmospheric Pollution: History, Science, and Regulation, by Mark Z. Jacobson, Cambridge University Press, Cambridge, 2002.
2. Air Quality, by Thad Godish, 4th Edition, Lewis Publishers, 2003.
3. Atmospheric Chemistry and Physics, by John Seinfeld and Spyros Pandis, John Wiley & Sons, 1997.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105102089/
2. Link to topics related tocourse:https://nptel.ac.in/courses/105104099/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
Department of Civil Engineering

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Air and Noise Pollution and Control)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	1	1	1	1	1	2	x	x	x	2	**1.33**
CO-2	2	3	3	3	3	2	x	1	2	1	x	1	**2.1**
CO-3	2	3	3	3	3	2	2	1	2	1	x	1	**2.1**
CO-4	2	1	1	2	1	1	2	2	2	1	1	2	**1.5**
Average	**2**	**2**	**2**	**2.25**	**2**	**1.5**	**1.67**	**1.5**	**2**	**1**	**1**	**1.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • H.P.
IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

COURSE OUTLINE

13B1WCI731 ARM based Embedded System Design

July- Dec 2017

Instructor:

Associate Prof. Dr. Vivek Kumar Sehgal

Description:

ARM designs the world's most popular processor architecture for embedded systems. The technology can be found at the heart of advanced digital products, from wireless, networking and consumer entertainment solutions to imaging, automotive, security and storage devices. This course is designed to provide the necessary knowledge to develop software for an ARM based system targeted in embedded software development. Topics cover the software aspects of ARM system which including assembly and C language programming and an introduction to the control and interfacing of embedded systems. Upon completion, students will understand the ARM architecture development, and will be familiar with supporting hardware and embedded system development process.

Goals of the Course:

1. Describe the architecture of a typical embedded RISC processor (e.g. ARM Cortex-M3)
2. Develop an understanding of the instruction set and addressing modes
3. Write programs that exercise a range of typical microcontroller peripherals (e.g. GPIO, USART, ADC, etc...)
4. Use a typical toolchain to implement and test simple embedded microcontroller applications in C and assembly language
5. Evaluate the requirements for embedded Real Time Operating Systems (RTOS)
6. Understand the structure of a RTOS (e.g. eLinux)

Textbook

Steve Furber, "ARM System-on-Chip Architecture", 2nd Edition, Addison Wesley Professional 2000

Detailed course notes and slides written by the lecturer will be served as the examinable materials for the course. All required course materials are available from the institute's WebCT Web site.

References

David Seal, "ARM Architecture Reference Manual", 2nd Edition, Addison Wesley Professional, 2000

Andrew Sloss, et al, "ARM System Developer's Guide: Designing and Optimizing System Software", 1st Edition, Morgan Kaufmann, 2004

1. Ability to use a computer to prepare written reports and to perform basic data reduction, graphing, and engineering data presentation.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Topics:

Week	Topics to be covered
1	Computer Architecture Introduction
2	ARM Software Development Tools and ARM Architecture Fundamentals
3	ARM Instruction Set Architecture and Addressing Mode
4	ARM Assembly Language Programming Basics
5	More on ARM Assembly Language Programming
6	The Thumb Instruction Set
7	Exception and Interrupt Handling
8	Programming Techniques for ARM
9	
10	ARM Processor Architecture
11	C Startup Sequence and ARM Based Hardware Consideration
12	Introduction to Debug Tools for ARM Based Systems
13	ARM Test Revision
14	ARM on virtual mchine
15	ARM Exam Revision

Resources:

1. ARM Architecture Reference Manual (local copy)
   ARM7TDMI Technical Reference Manual (local copy)
   ARM7TDMI Instruction Set Reference (local copy)
2. ARM7TDMI Quick Reference (local copy)
3. An Introduction to the GNU Assembler
4. An Introduction to the GNU Compiler
5. An Introduction to GNU Debugger
6. ARMv4T Partial Instruction Set Summary
   Pete Cockerell has put the text of his 1987 book "ARM Assembly Language Programming" on the web (local copy)
7. A book by Peter Knaggs and Stephen Welsh, ARM: Assembly Language Programming @2004 - download for free (local copy)
8. ARM System-On-Chip Architecture (2nd Edition) by Steve Furber (the father of the ARM processor) - download for free (local copy)

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Assignments, Quizzes, and Attendance	25	Entire Semester	Assignment (3) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Objectives:

CO-1	Computer Architecture Introduction
CO-2	ARM Software Development Tools and ARM Architecture Fundamentals
CO-3	ARM Instruction Set Architecture and Addressing Mode
CO-4	ARM Assembly Language Programming Basics
CO-5	More on ARM Assembly Language Programming
CO-6	The Thumb Instruction Set
CO-7	Exception and Interrupt Handling
CO-8	Programming Techniques for ARM
CO-9	ARM Processor Architecture

S No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	H	H	H	H	M	M	H	H	M	H	H	H	92%
CO-2	H	H	H	M	L	L	M	H	M	H	H	H	81%
CO-3	H	H	M	M	M	L	M	M	M	H	H	H	78%
CO-4	H	H	H	M	M	L	M	H	M	H	H	H	83%
CO-5	H	H	H	H	M	L	M	H	M	L	H	H	81%
CO-6	H	H	H	H	M	L	M	H	M	M	H	H	83%
CO-7	H	H	M	M	M	H	H	M	M	H	H	H	86%
CO-8	H	H	H	H	H	M	H	H	M	L	H	L	83%
CO-9	H	H	H	H	M	H	H	H	M	M	H	L	86%
	100%	100%	93%	85%	67%	56%	81%	93%	67%	78%	100%	85%	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Artificial Intelligence

COURSE CODE: 18B1WCI742

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structure, Discrete Structure

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction:** Intelligence, Definitions of Intelligent Agents **Single-Agent Search:** Breadth-first, Depth-first and Iterative Deepening Search, Heuristic Search (A* search), Stochastic Local Search (Simulated Annealing, Genetic algorithms)	7
2	**Adversarial Search:** Minimax Search, Alpha-beta pruning, Stochastic Games and Expectiminimax **Knowledge Representation and Logic:** Propositional Logic, Propositional Inference , First-Order Logic, Propositional Inference (Forward chaining, Backward chaining)	7
3	**Reasoning Under Uncertainty:** Probability Bayes Rule , Bayesian Networks, Bayesian Inference	7
4	**Machine Learning**: Definition and examples of broad variety of machine learning tasks, including classification, Inductive learning, Simple statistical-based learning, such as Naive Bayesian Classifier, decision trees, The over-fitting problem, Measuring classifier accuracy	11
Total lectures		**32**

Suggested Text Book(s):

1. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
2. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Reference Book(s):

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Machine Learning by Tom M. Mitchell
3. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb

Other useful resource(s):

1. Link to NPTEL course contents:
   i. https://nptel.ac.in/courses/106105077/
   ii. https://nptel.ac.in/courses/106105079/
2. Link to topics related to course:
   i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   ii. https://ai.google/education/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Artificial Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	2	1	2	1	2	2	2	1.9
CO-2	3	3	3	1	3	2	1	2	1	2	3	2	2.2
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Weightage	3	3	3	2.2	2	1.4	1.6	2	1.6	2	2.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Bioenergy and Biofuels	
14B1WBT731		**Elective Course**
		Credits: 3
		L 3 T 0 P 0

Pre-requisites: None

Course Objectives (Learning Goal):

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economical issues related to first, second and third generation biofuels along with Physico chemical techniques

.

Course Assessment:

T1	15
T2	25
T3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes: After the course the students will be able to

CO I: Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels

CO II: Technical barriers in Bioenergy and Biofuel Technology

CO III: Whole biorefinery approaches for economical implementation into the market.

CO IV: Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Topics covered:

Introduction to Biofuels and Bioenergy: Definition, Global Energy Outlook, Sustainability, **Biomass** Feedstocks, Processes and Technologies, Environment and Ecology

Crop Oils, Biodiesel, and Algae Fuels; Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel

Ethanol from Corn and Lignocellulosics: Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-to-Ethanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction

Fast Pyrolysis and Gasification of Biomass: Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas

Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock: Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock

Text Books:

Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press

Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers .

Reference material

Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels	H	H	H	H	H	H	H	100
CO-II	Technical barriers in Bioenergy and Biofuel Technology	H	H	H	M	H	H	M	90.47
CO-III	Whole biorefinery approaches for economical implementation into the market	H	H	H	H	H	H	M	95.23
CO-IV	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy	H	H	H	H	H	H	H	100
	Assessment (%)	100	100	100	91.66	100	100	83.33	

1. Low
2. Medium
3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

Biosensors-Principles and Applications

Course Code: XXXXXXX
Course Credits: 3
Elective
L-T-P: 3-0-0

Pre-Requisite: Fundamental Physics and Chemistry and Advance Biology

Course Objectives

1. This course introduces the students to the highly interdisciplinary field of biosensors.
2. Learn the fundamental concept of biosensors, design and fabrication.
3. Learn different type of biosensor and their applications in healthcare or agriculture

Course Outcomes

CO I	Able to understand the fundamentals of biosensors: Types, characteristics, operating condition and applications.	Familiarity
CO II	To develop a fundamental concept of molecular reorganization for biosensor development.	Assessment
CO III	Able to understand the basics principle related with bioinstrumentation and electrochemical sensor fabrication.	Assessment& Technical
CO IV	Able to understand the basics principle related with bioinstrumentation and optical and nanosensor fabrication.	Assessment& Technical
CO V	Fundamental understanding of sensor application in medicine, health, agriculture, environment and food science.	Usage

Course Content:

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Introduction**	Overview of biosensor and applications: medicine, agriculture, bio-production, and environment, Desired characteristics of biosensors: reliability, simplicity, cost, and related parameters, Application notes: operating conditions, calibration, positive and negative controls, safety.	6
2	**Biosensors and electrochemistry**	Molecular reorganization: Enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity, Fundamentals of surfaces and interfaces.	7
3	**Bioinstrumentation and bioelectronics devices**	Principles of Potentiometry and potentiometric biosensors, Principles of amperometry and amperometric biosensors, Electrochemical Sensors Optical Biosensors based on Fiber optics and nanomaterial. Principle of fluorescence biosensor, SPR biosensor. Introduction to electronic nose and electronic tongue. Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology	14
4	**Application And uses of Biosensors**	Biosensors in clinical chemistry, medicine and health care, biosensors for veterinary, agriculture and food Low cost - biosensor for industrial processes for online monitoring; biosensors for environmental monitoring. Application of enzymes in analysis; design of enzyme	12

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		electrodes and their application as biosensors in industry, healthcare, food and environment. Basics of In- Vivo Biosensor, The Glucose Biosensor, Microbial Biosensor	
5	**Biosensors For Clinical Analysis**	Biosensors for personal diabetes management (Glucose, Galactose, Gluconate, Lactate, Pyruvate Sensors) Noninvasive Biosensors in Clinical analysis and health care	3
	Total Number of Lectures		**42**

TEXT BOOKS

1	Biosensors: Fundamentals and Application: Anthony P.F. Turner, Isao Karube George S. Wilson, Oxford University Press
2	Body sensor Network: Biosensors and Sensor System. Danny O'Hare g, Imperial College London, London SW7 2BY, UK
3	Introduction to biosensor: from electric circuit to immunosenssor, J.Y.Yoon, Springer,-Switzerland.

REFERENCE MATERIAL:

1	Biosensors and Nanobiosensors: Designand Applications, Ahmed Touhami, University of Texas at Brownsville
2	Electrochemical DNA Biosensor: M.Ozsoz. CRC press, Taylor & Francis group

Other useful resource(s):

- Link to NPTEL course contents: https://nptel.ac.in/courses/118106019/36
- https://nptel.ac.in/courses/105107173/53

Methodology

- The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Biosensors: Principles and Application)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	Average
CO-1	2	2	2	1	2	3	2	1	1	1	2	2	2	1	1.7
CO-2	3	2	3	2	3	2	2	1	2	2	2	3	3	2	2.3
CO-3	3	2	3	2	3	2	2	1	1	1	2	2	2	2	2.0
CO-4	3	2	3	2	3	3	2	1	1	1	2	2	2	2	2.0
CO-5	2	2	2	2	2	3	3	2	2	2	3	3	3	2	2.3
Average	**2.6**	**2.0**	**2.6**	**1.8**	**2.6**	**2.6**	**2 .2**	**1.2**	**1.4**	**1.4**	**2.2**	**2.4**	**2.4**	**1.8**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Business Analytics

COURSE CODE:18B1WHS632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand facets of business analytics within an organization.
2. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
3. To become familiar with the processes needed to develop, report, and analyze business data.
4. To analyze real world business problems, not only with the context of the company but also with the context of the society, with the help of modern concepts and tools and techniques of the concerned area.
5. To provide an optimal solution which benefits both the company and the society as a whole.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understanding the concepts and dimensions of business analytics	Familiarity
CO-2	Formulations of business analytics problems	Assessment
CO-3	Developing and reporting of the problems after proper assessment	Assessment
CO-4	Analyzing problems using different tools and techniques of business analytics	Usage
CO-5	Designing an optimal strategy to help the company	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction and importance to Business Analytics, Categorization of Analytical Methods and Models, Business Analytics in Practice – Marketing, HR, Finance etc.	3
2	**Business Analytics Models:** Overview and Deployment of Business Analytics Models	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
IQAC

3	**Exploring Data:** Describing the distribution of single variable – Types of data, categorical variables etc,; Relationships among variables – categorical variables, categorical and numerical variables and numerical variables	6
4	**Probability and Decision Making:** Probability and distributions – single random variables; Distributions – normal, binomial, poisson and exponential; Decision making under uncertainty – elements of decision analysis, precision tree, Bayes' rule, multistage decision problems; Applications in Business Management	7
5	**Statistical Inference:** Sampling and sampling distributions; Confidence Interval Estimations; Hypothesis testing; Applications in Business Management	7
6	**Regression Analysis:** Regression Analysis – Estimation; Regression Analysis – Inference; Applications in Business Management	8
7	**Simulation Modeling:** Introduction to Simulation Modeling; Simulation Models – Operations, Financials, Marketing Applications in Business Management	9
Total Number of Lectures		**42**

Suggested Text Book(s):

1. S. Christian Albright and Wayne L. Winston: Business Analytics: Data Analysis and Decision Making, Cengage Learning, 5e

Suggested Reference Book(s):

1. Jeffrey D Camm et al.: Essentials of Business Analytics, Cengage Learning
2. Halady P: Business Analytics: An Application Focus, PHI
3. Seema Acharya and R. N. Prasad: Fundamentals of Business Analytics, Wiley
4. Some real life data from different government/non-government sources will also be discussed and analysed.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1-> Unit 1, 2 and 3
2	T-2	25	1.5 Hours	Syllabus covered upto T-2->Upto T1 + Unit 4and 5 (partially)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Attendance – 5 Class Performance - 10 Quizzes –10

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	2	2	2	2	1	2	1	2	3	1	2	1.67
CO-2	0	3	2	3	3	1	1	1	2	1	2	1	1.67
CO-3	0	2	1	1	1	1	1	0	0	1	1	1	0.83
CO-4	1	3	2	3	3	1	2	1	1	1	2	1	1.75
CO-5	0	1	3	3	3	1	1	1	1	1	1	1	1.42
Average	0.20	2.20	2.00	2.40	2.40	1.00	1.40	0.80	1.20	1.40	1.40	1.20	1.47

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

C# and VB.NET

COURSE CODE: 18B1WCI637

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: C/C++ and OOPs

Course Objectives:

1. Knowledge of .NET Framework.
2. Programming in C # and VB.NET in Visual Studio Environment
3. Knowledge of object-oriented programming in the C # and VB.NET languages
4. Programming for windows application development
5. Programming for web application development

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Comprehensive knowledge of .NET Framework, C#.NET and VB.NET	Familiarity
CO-2	Knowledge of C#.NET and VB.NET languages.	Assessment
CO-3	Students will able to develop windows applications using C# and VB.NET	Assessment
CO-4	Students will able to develop web applications using ASP.NET with C# and VB.NET	Assessment
CO-5	Develop a data driven windows and web application	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**.NET Framework**: Introduction to C#.NET, VB.NET and VS.NET, Features of C#.NET,VB.NET and VS.NET, The Common Language Runtime (CLR), Memory Management, Cross Language Integration, metadata and the IL Disassembler. C# and VB.NET basics ,Class, Objects, Inheritance, Polymorphism, Error Handling, Common Type System (CTS), .NET Framework Class Library (FCL), Microsoft Intermediate Language(MSIL), Just In Time(JIT) Compiler, Garbage Collection	7
2	**Windows Programming:** Intro to C# and VB.NET GUI dev in Visual Studio, Windows Forms and built in controls, Delegates and Events, Common Controls, Button, CheckBox, Label, Dialog boxes, TreeView and ListView, Custom Controls etc.	7
3	**ASP.NET using C# and VB.NET**: Introduction of ASP.NET using C# and VB.NET, Concept of Web Applications, ASP.NET Architecture, Page Composition Parts ASP.NET, Page Life Cycle, Page Life Cycle Events, ASP.NET Server Controls, HTML Server Controls, Web Server Controls, List Controls, Validation Controls, User Controls & their uses, Navigation Controls, Login Controls, Custom Controls	11
4	**ADO.NET:** Introduction of SQL, Components of SQL, Basic SQL Commands, Data Binding in ASP.Net, Data Binding Expressions, Data Sources & Controls, Insert, Update, Delete Operations using Data Source Controls, Working with Grid View Control Data bound controls DetailsView control **Security and Deployment:** Security in the .NET framework and Deployment in the .NET	7

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Total lectures	32

Suggested Text Book(s):

1. .NET Framework Essentials, 3rd Edition by By Hoang Lam, Thuan Thai Publisher: O'Reilly Media
2. Head First C#, 3rd Edition By Andrew Stellman, Jennifer Greene Publisher: O'Reilly Media
3. ASP.NET 4 Unleashed 1st Edition, by Stephen Walther

Suggested Reference Book(s):

1. Pankaj Agrawal – Principal of .Net Framwork
2. Vaya Kogent - .NET Programming Black Book – Wiley
3. VB.NET Black Book by Steven Holzner –Dreamtech
4. VB.NET –Wrox Publication
5. C# programming Black Book by Matt Telles

Other useful resource(s):

1. Link to topics related to course:
   - i. https://docs.microsoft.com/en-us/dotnet/
   - ii. https://msdn.microsoft.com/en-us/library/ff361664(v=vs.110).aspx
   - iii. https://msdn.microsoft.com/en-us/library/aa286485.aspx
   - iv. https://blogs.msdn.microsoft.com/dotnet/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (C# and VB.NET)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	21	3	4.2
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.8	2.8	2.2	2	2.2	3	5	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Computational Systems Biology

14B1WBI732 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology and various kind of biological pathways, graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop system level understanding of biological entities for various kind of pathways.

Course Assessment:

T-1 Test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation

CO II: Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering

CO III: Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems

Topics covered:

Introduction to Systems biology and computational systems biology, basic principles of components and systems. top down and bottom up approaches, reductionist and integrative approaches for dealing with biological systems. Gene regulatory network (GRN) analysis, genes, operons, regulons, stimulons. Symbols on gene networks and pathways and their relation with

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT

the involved entities. Experimental and computational methods available for GRN. Signal transduction pathways and metabolic pathways, Modeling Complex Biological Systems, and Mass/Flux Balance Analysis. Stoichiometry analysis for component and systems level along with their applications. XML for Bioinformatics and systems biology, includes BioXML, SBML, CellML and their practical applications towards modeling and simulations of biological systems. Incorporation of MathML and CML into standard markup languages for systems biology. Systems Approach to Metabolic Networks and Protien-Protein Interaction Networks, Online tools, databases, and other web based applications for Systems Biology: STRING, BIND, MINT, IPATH, GeneGo, Gypasi, MetaCYC, EcoCyc, RegulonDB, AtPID, JASPAR, TFDB etc. Biocircuits: Blocks and Designing; Various case studies along with their applications E-Cell, virtual cell and other bio-electronic projects.

Text and Reference books

1. Systems Modeling in Cellular Biology
   by Zoltan Szallasi, Joerg Stelling, Vipul Periwal, MIT Press,
2. Systems Biology : Properties of Reconstructed Networks
   by Bernard Palsson, Cambridge Univ. Press
3. Advances in Systems Biology (Advances in Experimental Medicine and Biology).
   Opresko, L., Gephart, J., and Mann, M. (eds.), Plenum US, 2005
4. Artificial Intelligence Methods and Tools For Systems Biology
   Dubitzky, W. and Azuaje, F. (eds.), Kluwer Academic Publisher
5. Metabolome Analyses: Strategies for Systems Biology
   Vaidyanathan, S. et al (eds.), Springer-Verlag
6. Systems Biology in Practice: Concepts, Implementation And Application
   Klipp, E et al., John Wiley & Sons Inc.
7. Foundations of Systems Biology
   Kitano, H.(ed.); The MIT Press
8. Systems Biology
   Alberghina L. and Westerhoff, H.V., eds.; Springer Verlag

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation	H	H	H	H	H	H	M	95
CO-II	Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering	M	H	H	H	H	H	M	90
CO-III	Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems	H	H	H	M	H	H	H	95
	Assessment (%)	89	100	100	89	100	100	78	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Design of Dependable Systems

COURSE CODE: 18B1WEC846

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Graph Theory and Computer Communication Network

Course Objectives:

1. Incorporate the concepts of dependability in the design of critical systems.
2. Propose an architectural framework for the design of systems based on information and communication technologies.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Introduction to dependability attributes such as availability, reliability, safety, QoS, SLA in systems.	Familiarity
CO-2	Familiarization with dependability analysis approaches.	Familiarity
CO-3	Application of methodologies used dependability modeling.	Usage
CO-4	Design of dependability schemes on practical systems.	Usage
CO-5	Evaluation of survivability of networks, dependability evaluation of networks.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Dependability attributes: availability, reliability, safety, QoS, SLA.	5
2	Analysis Approach of Dependability: The failure process, failure semantics, fault handling and maintenance, failure rate, probability distributions, series/parallel systems, Markov models.	6
3	Dependability modeling: Block diagrams and state diagrams - discrete and continuous time Markov models. Fault Trees and Fault Injection. Modeling of software failure, prediction of software failure rates, and impact of software failures on systems behavior.	8
4	Design of Dependability: Fault tolerance, types of redundancy, design principles and mechanisms. Fault detection, tolerance and recovery, Lifetime improvement.	8
5	Prediction of hardware failure rates: Software/hardware and architectural approaches space, information and time redundancy. Design for testability. Model-driven approaches Diagnosis.	7
6	Internet QoS, survivability of networks, dependability evaluation of networks taking the traffic carrying (QoS) requirements into account. QoS guarantee analysis. Some applications of dependability in IT related services.	8
Total lectures		42

Suggested Text Book(s):

1. Ajit Kumar Verma, Srividya Ajit, Dependability of Networked Computer-based Systems, Springer Series in Reliability Engineering, 1st edition, 2013.
2. J.C. Geffroy, G. Motet, Design of Dependable Computing Systems, Springer-Science-Business Media B.V., 1st edition, 2002.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3. J.C. Laprie, Dependability: Basic Concepts and Terminology, Springer-Verlag,1st edition,1992.

Suggested Reference Book(s):

1. Dhiraj K. Pradhan, Fault-tolerant computer system design, Prentice-Hall,1st edition, 1996.
2. M.L. Shooman, Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design, Wiley, 1st edition, 2002.
3. Krishna B. Misra, Handbook of Performability Engineering, Springer, 1st edition,2008.

Other useful resource(s):

1. Link to NPTEL course contents:_ https://onlinecourses.nptel.ac.in/noc16_oe01/preview
2. Link to topics related to course:https://www.mdh.se/utbildning/livslangtlarande/prompt/design-of-dependable-and-fault-tolerant-embedded-systems-1.120193?l=en_UK

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Design of Dependable Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	2	2	2	2	2	2	2	2
CO-2	2	2	2	2	3	2	2	1	1	3	2	2	2
CO-3	3	2	2	2	2	3	3	2	2	2	3	2	2.33
CO-4	2	3	2	3	3	2	3	2	3	3	2	3	2.6
CO-5	2	2	3	2	2	3	3	1	2	2	2	2	2.16
Average	2.4	2.2	2.2	2	2.4	2.4	2.6	1.6	2	2.4	2.2	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

DIGITAL SYSTEM DESIGN

(Elective Subject)

Course Code:	12B1WEC732	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. To design digital circuits based on the required application
2. It offers a profound understanding of the design of complex digital circuits and their implementation for real time applications.

Course Outcomes

After studying this course the students would gain enough knowledge

1. To use state machine diagrams to design finite state machines using various types of flip-flops and combinational circuits with prescribed functionality.
2. Design state machines to control complex systems.
3. Define and describe digital design flows for system design and recognize the trade-offs.
4. Understand and design System controllers.
5. The ability to identify and prevent various races and hazards and timing problems in a digital design.
6. Write synthesizable VHDL program.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Digital Design Concepts, Review of digital design fundamentals, minimization and design of combinational circuits, sequential machine fundamentals: the need, concept of memory, Flip flops, sequential machine operations, classifications.	Text Book 1: Chapter 1-5	4
2.	Design of Synchronous Sequential Circuits-Sequential circuits, Finite state model – Basic definition, capabilities and limitation of finite state machines, state equivalence & machine minimization, simplification of incompletely specified machines, Extraction of maximal compatibles, synthesis & analysis of synchronous sequential circuits. Introduction to Multi-Input System controller design: system controllers, frequency and time consideration, MDS diagram generation, CPLD and FPGA	Text Book 1: Chapter 6	12

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	level custom design.		
3	Design of Asynchronous Sequential Circuits - Introduction to asynchronous circuits, timing diagram, state diagram & flow tables, types of asynchronous circuits, fundamental mode circuits, pulse mode circuits, state assignment in asynchronous sequential circuits, Synthesis and analysis, ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, Data path control path partition-based design	Text Book 1: Chapter8	12
4	Hazards and Races - Introduction, gate delays, generation of spikes, production of static hazards in combinational networks, elimination of static hazards, design of hazard free combinational networks, hazard free asynchronous circuit design, dynamic hazards, essential hazards, Races and Cycles.	Text Book 3: Chapter 10	8
5	VHDL/ Verilog HDL - Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches. Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.	Text Book 4: Chapter 1-3	6
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. John M Yarbrough : Digital Logic Applications and Design, 2nd Edition, Thomson Educaion

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

2. W. I. Fletcher :An Engineering approach to Digital Design , PHI
3. M.Morris Mano : Digital Design, 3rd edition, Pearson Education, 2007.
4. Michael D. Ciletti: Advanced Digital Design with Verilog HDL, PHI, 2005.

Reference Books

1. Digital Systems Design using VHDL – Charles H Roth, CENGAGE Learning.
2. Switching and Finite Automata Theory by ZVI Kohavi, TMH

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

S.No	13B1WCI731 ARM based Embedded System Design	Level of Attainment	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	Weightage
1	An Introduction to Processor Design: • The fundamental knowledge needed for the Processor architecture and organization, Abstraction in hardware design. • RISC Architecture. • Design for low power consumption.	Familiarity	H	M	M	L	M	H	H	M	L	H	73%
2	The ARM Architecture: • To study Acorn RISC Machine with Architectural inheritance. • The ARM programmer's model and ARM development tools	Familiarity	H	H	H	L	L	H	H	H	M	H	84%
3	ARM Assembly Language Programming: • Data processing, data transfer and control flow instructions. • To write simple assembly language programs.	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
4	ARM Organization and Implementation: • 3-stage and 5-stage pipeline ARM organization. • ARM instruction execution and implementation. • The ARM coprocessor interface.	Technical skills	H	H	H	M	M	M	H	M	M	M	80%
5	The ARM Instruction Set: • To study the complete instruction set of ARM architecture.	Technical skills	H	H	H	M	M	M	M	M	L	H	73%
6	Architectural Support for High-Level Languages: • Abstraction in software design, Data types, Floating-point data types. • The ARM floating-point architecture • Expressions, Conditional statements, Loops, Functions and procedures and use of memory.	Technical skills	H	H	H	H	M	H	H	M	M	H	92%
7	The Thumb Instruction Set: • To understand the Thumb programmer's model. • To have fundamental knowledge of the Thumb software interrupt, data processing, single register data transfer, multiple register data transfer and breakpoint instructions. • Thumb implementation and applications	Assessment	H	H	H	H	M	H	H	M	M	M	88%

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

8	Architectural Support for System Development: • To understand The ARM memory interface 208 • The Advanced Microcontroller Bus Architecture (AMBA) • Understanding the basics of The ARMulator • The ARM debug architecture	Assessment	H	H	H	M	M	H	H	H	M	H	92%
9	ARM Processor Cores: To have fundamental knowledge of the cores: • ARM7TDMI • ARM8 • ARM9TDMI • ARM10TDMI	Assessment	H	H	H	H	M	H	H	H	M	M	85%
10	Memory Hierarchy: • On-chip memory, its size and speed. • To understand basics of Caches and Cache design • Memory management	Technical skills	H	H	H	M	M	M	H	M	M	M	80%
11	Architectural Support for Operating Systems: • Introduction to concept of the ARM system control coprocessor • Synchronization • Context switching	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
12	ARM CPU cores: • Fundamental knowledge of ARM710T, ARM720T and ARM740T ARM CPU cores	Assessment	H	H	H	H	M	H	H	M	M	M	88%
13	Embedded ARM Applications: • Understanding The VLSI Ruby II Advanced Communication Processor • The OneC VWS22100 GSM chip 352 • The Ericsson-VLSI Bluetooth Baseband Controller.	Computational skills	H	H	H	L	M	H	M	H	M	H	84%
	TOTAL		100%	98%	98%	64%	64%	92%	90%	82%	61%	80%	

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

List of Programme Outcomes (PO) for CSE

PO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

PO-2: An ability to apply knowledge of mathematics, science, and engineering to real-life problems.

PO-3: Ability to model, understand, and develop complex software and information management systems.

PO-4: An ability to function effectively within teams.

PO-5: An understanding of professional and ethical responsibility.

PO-6: An ability to communicate effectively, both in writing and oral.

PO-7: The broad education necessary to understand the impact of Computer Science and Engineering solutions in the societal and human context.

PO-8: A recognition of the need for, and an ability to engage in life-long learning.

PO-9: A knowledge of contemporary issues.

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

List of POs for IT

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals;

PO-2: Acquire in-depth technical competence in a specific Information Technology discipline;

PO-3: Ability to undertake problem identification, formulation and solution;

PO-4: Ability to utilize systems approach to design and evaluate operational performance;

PO-5: Understanding of the principles of design for sustainable development;

PO-6: Understanding of professional and ethical responsibilities and commitment to them;

PO-7: Ability to communicate effectively, not only with engineers but also with the community at large

PO-8: Ability to function effectively as an individual and in a group with the capacity to be a leader or manager;

PO-9: Understanding of the social, cultural, global and environmental responsibilities of a professional engineer;

PO-10: Recognizing the need to undertake life-long learning, and possessing/acquiring the capacity to do so.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

10B1WPD731 Entrepreneurship Development

Course Goal

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Course Objectives

After the completion of the course, the students:

- Have the ability to discern distinct entrepreneurial traits
- Know the parameters to assess opportunities and constraints for new business ideas
- Understand the systematic process to select and screen a business idea
- discern the factors that can deem the idea successful and viable
- write a business plan

Detailed Syllabi
Lecture-wise Breakup

Subject Code	10B1WPD731	**Semester**	7
Subject Name	**Entrepreneurship Development**		
Credits	3	**Contact Hours**	42

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction to Entrepreneurship	Role of the entrepreneur in India and around the globe; forces that are driving the growth of entrepreneurship; benefits and drawbacks of entrepreneurship; mistakes of entrepreneurship and how to avoid them; entrepreneurial failure.	5
2.	Overview of business and its functioning	Business and industry; Components of macro and micro business environment	4
3.	Business Idea and Feasibility	Creativity, innovation and entrepreneurship; mental locks" that limit individual creativity; steps in the creative process; techniques for improving the creative process; protection of intellectual property involving patents, trademarks, and copyrights.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

4.	**Strategic Management and Entrepreneur**	Importance of strategic management to a (small) business; understanding competitive advantages; steps in the strategic planning process; basic strategies: low-cost, differentiation, and focus; balanced scorecard in the planning process.	4
5.	**Forms of Business Ownership**	Advantages and the disadvantages of the three major forms of ownership: the sole proprietorship, the partnership, and the corporation. LLP and types of franchising: trade name, product distribution, and pure. Major trends shaping franchising.	4
6.	**Building the business plan :marketing considerations**	Marketing concept and evolution; marketing process; guerilla marketing	4
7.	**Foundations of New Venture Finance**	Understanding capital requirements; identifying the sources of finance; angel investing and venture finance; managing cash flow	5
8.	**Creating the Organization : structure and design**	Forms of organization structure; factors contingent on organizational structure and design	4
9.	**Technical entrepreneur and The E-entrepreneur**	Process of creating and growing high potential ventures; basic approaches to launch an e-commerce effort	4
10.	**Crafting a winning business plan**	Need and importance of business plan; elements of a solid business plan.	4
		Total number of Lectures	42

Recommended Reading	
1.	**Entrepreneurship and New Venture Formation**: Thomas W. Zimmerer, and Norman M. Scarborough. PHI
2.	**Entrepreneurship: Strategies and Resources**, 3/E -: Marc Dollinger; Prentice Hall
3.	**Bringing New Technology to Market**- Kathleen R. Allen, Prentice Hall

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

4.	**Entrepreneurship in Action**, 2/E - Mary Coulter; Prentice Hall

Methodology & Evaluation	
The course essentially follows an interactive teaching- learning mode; classroom discussions on core concepts, open-forum discussions, use of multi-media cases and guest speakers.	
Evaluation	
T1	15 marks
T2	25 marks
T3	35 marks
TA	25 marks 1. Entrepreneurial solution to present day social problems 2. Video case 3. Spot exercise : Exercise based on segmentation and strategies 4. Group presentation -1 5. Group presentation -2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology

Department of Computer Science and Engineering

B.Tech (CSE& IT) Semester VII

Course Information:

Course Title:	Graph Algorithms and Applications
Course Code:	10B1WCI733
Credits:	Three (3)
Instructor:	Ravindara Bhatt
Office:	1st Floor, Vivekananda Bhawan
Telephone:	01792-239335

Course Contents: As in the handbook

Examination System:

Term Tests:	75%	(T1: 15%; T2: 25%; T3: 35%)
Internal Assessment:	25%	(Assignment -12,Quizzes -9,Class participation -4)

References:

1. Deo, N., Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall, 1974.
2. Douglas B. West, Introduction to Graph Theory, PHI, second edition, 2001.
3. Cormen, T., Leiserson, C.,Rivest, R. and Stein, C., Introduction to Algorithms., MIT Press, 2001.
4. Gibbons, A., Algorithmic Graph Theory, Cambridge University Press, 1985.
5. Aho, A., Hopcroft, J. and Ullman, J., The Design and Analysis of Computer Algorithms, Addison-Wesley, 1974.
6. Rosen. K, Discrete Mathematics and its Applications, McGraw-Hill, 2007.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Human Rights for Technocrats

COURSE CODE: 18B1WHS641

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Conceptual background of human rights and duties:** Definitions and classifications	2
2	**Meaning and Significance of Human Rights :** Scope of the Human Rights	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Relationship between Rights and Duties:** Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	**Universal Declaration of Human Rights: Technical background :** Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5
5	**History of human rights civilization:** Brief history of human Rights, The Spread of Human Rights, Middle Ages, Modern human rights	5
6	**Human rights movements :** Anti-colonialism, World War II and the United Nations, Global human rights struggles, Changes in the 1970s Since the 1990s	8
7	**Enforcement and protection mechanism of human rights in India :** Judiciary, National Human Rights Commission and other Commissions and Committees , Non-governmental organizations, Information Media, Education	5
8	**Development, international trade and human rights:** Right to development: Issues of international equity and justice, equitable access to benefits of science and technology, Freedom of international trade, most-favoured nation treatment (equality of treatment) versus special treatment of the developing countries, access to international markets, equitable pricing of raw material	5
9	**Human rights, science and technology:** Overview,violation of human rights by technology	3
10	**Human rights of the working class:** Labour welfare legislation in India, Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	4
Total lectures		42

Suggested Text Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Suggested Reference Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Other useful resource(s):

1. https://www.google.com/search?q=Meaning+and+Significance+of+Human+Rights&rlz=1C1GCEU_enBIN820IN820&oq=Meaning+and+Significance+of+Human+Rights&aqs=chrome..69i57j0l5.1710j0j7&sourceid=chrome&ie=UTF-8
2. https://www.equalityhumanrights.com/en/human-rights/what-are-human-rights

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Presentation (1)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Human Rights for Technocrats)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75
CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Hydropower Engineering

COURSE CODE: 10B1WCE732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Fluid Mechanics

Course Objectives:

1. To get familiar with the various types of hydro powerplants
2. To impart the knowledge of design of different hydraulic components of HPplant
3. To gain Knowledge about different types of steps involved in planning of water resourceproject

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Knowledge of Various types of HP plants, turbines and its selection criteria.	Assessment
CO-2	Principles and design of various types of hydraulic structures required in HP Scheme.	Assessment
CO-3	Understanding of Economics of Power Generation.	Assessment
CO-4	They will develop understanding of special features of mini, micro hydel plants.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: purpose served by HP projects, Functional requirements in multiple purpose projects, compatibility, steps involved in planning of water resource project, financial analysis of a project, site investigations, Hydrological investigations, assessment of Hydropower potential, water availability, installedcapacity determination.	8
2	**Principles of hydropower development:** Application, advantage and disadvantages of schemes, classification of hydropower schemes and their layouts, Principal components of Hydro-electric scheme	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Hydraulic turbines:** Classification and selection of turbines, governing of turbines	7
4	**Design of civil works**: Diversion structures, water conductor systems, desilting tanks, cross drainage structures, forebay, Surge tanks and hydraulic transients, Penstocks and pressure shafts, Intakes, penstock, powerhouse, and tailrace.	5
5	**Economics of Power Generation:** Terms and definitions, cost analysis, combined operation of different power plants, Operation of power plants for peaking and base load, principles of power plant design, location of power plant, economics in plant selection, factor affecting economics of generation and distribution of power Tariff for electrical energy.	8
6	**Mini, micro, hydel plants**: Special features of mini, micro hydel plants, civil works of medium and high for mini, micro, hydel plants, different types of turbines	7
Total lectures		**42**

Suggested Text Book(s):

1. Rajput RKText Book of Power Plant Engineering, Laxmi Publications Pvt. Ltd.,2007.
2. Modi, P.N. and Seth, S.M., Hydraulic and Fluid Machines, Standard book house New Delhi,1995.
3. Dandekar, M. M. and Sharma, K. N.: water power Engineering, Vikas Publishing House,2005.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105105110/35-37

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Hydropower Engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	3	3	3	1	1	2	3	**2.25**
CO-2	3	3	3	3	2	3	3	3	2	1	3	3	**2.67**
CO-3	3	3	3	3	2	2	2	2	2	2	3	3	**2.5**
CO-4	3	3	3	3	3	2	2	2	2	3	2	3	**2.58**
Average	**3**	**2.75**	**2.75**	**2.75**	**2.25**	**2.5**	**2.5**	**2.5**	**1.75**	**1.75**	**2.5**	**3**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE DESCRIPTION

Course Name:	**Image Processing Techniques**
Course Code:	10B1WCI737
Course Credits:	3 (3-0-0)
Branch and Semester:	B.Tech – 7th Semester (CSE/IT/ECE)
Session:	July – December, 2017
Faculty Coordinator:	Dr. Amit Kumar Singh

Pre-requisites: Linear algebra, Matrices, Matrix Operations, Determinants, Systems of Linear Equations, Eigen values, Eigenvectors, Statistics and probability, Programming experience, preferably in matlab, and/or C/C++/C#/Python/Java

Objective: The aim of the course is to introduce the student to various image processing techniques. The student learns about image fundamentals, describes the main characteristics of digital images, how they are represented, mathematical transforms such as such as Fourier, Cosine transforms, Singular value decomposition, 2D Wavelet transform, image enhancement techniques, Image restoration and denoising, segmentation, lossy and lossless data compression algorithms, binary and color image processing. The student will be exposed to dealing with image data through programming assignments using matlab, and/or C/C++/C#/Python/Java.

Learning Outcome:

Upon completion of this course, a successful student should be able to design and implement programs that deal with image data.

- To understand how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.
- Emphasis will be to develop engineering skills and intuitive understanding of the tools used in Image Processing.
- The students would be encouraged to design and develop the image processing algorithms/tools to real life problems.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course contents:

S. No.	Topic	L
1	**Introduction to Digital Image Processing** Introduction to images and its processing, Components of image processing systems, image representations, Image file formats, Applications of digital image processing, image sampling and quantization, Image Analysis, Intensity transformations, contrast stretching, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.	5
2	**Image Transformation Techniques** Need for transform, Fourier, Cosine transforms, Haar, KL Transform, Singular value decomposition, 2D Wavelet transform, Different properties of image transform techniques.	8
3	**Image Compression Basics** Concept of image compression, lossless techniques (Huffman Coding, Arithmetic and Lempel-Ziv Coding, Other Coding Techniques) and lossy compression techniques (Transform Coding & K-L Transforms, Discrete Cosine Transforms, and BTC), Multi-Resolution Analysis, and Still Image Compression Standards (JBIG and JPEG),	8
4	**Image Enhancement** Enhancement in spatial and transform domain, histogram equalization DirectionalSmoothing, Median, Geometric mean, Harmonic mean, Cont raharmonic mean filters, Homomorphic filtering,Color image enhancem ent.	5
5	**Image Restoration and Denoising** Image degradation, Type of image blur, Classification of image restoration techniques, ,image restoration model, Linear and non linear restoration techniques, Image denoising, Median filtering	5
6	**Image Segmentation** Classification of image segmentation techniques, Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation	5
7	**Binary and Color image processing** Binarization, Basic Set theory, Binary morphological operations and its properties, Color Image Representation in MATLAB, Converting Between Color Spaces, The Basics of Color Image Processing, Color Transformations, Spatial Filtering of Color Images, Working Directly in RGB Vector Space	5
8	**Image Processing Applications:** Case studies	4
	Total Hours	**45**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	Test -1	15	1 hr.	Syllabus covered up to Test- 1.
2	Test -2	25	1.5 hr.	Syllabus covered up to Test- 2.
3	Test -3	35	2 hr.	Complete Syllabus.
4	Assignments/Homework/Small Projects (5), Quizzes (5), Regularity in Attendance (5), Researching and presenting a technology review topic (10)	25	Entire Semester	5+5+5+10
	TOTAL =	**100**		

Recommended Books

1. Digital Image Processing, R.C. Gonzalez and R.E. Woods, 2nd edition, Pearson Prentice Hall, 2008
2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, 1989.
3. Digital Image processing, S Jayaraman, TMH, 2012
4. William K. Pratt, *Digital Image Processing*, 3rd Edition, John Wiley, 2001.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Industrial Enzyme Technology

COURSE CODE

COURSE CREDITS: 3

CORE/ELECTIVE:

L-T-P: 3-0-0

Pre-requisite: Enzyme screening production purification and applications

Course Objectives

1. The objective of the course is to develop an understanding of important aspects of production and purification of industrially important enzyme and their application in industry.

Course Outcomes

Sr. No.	Course outcomes	Level Attainment
CO I	To develop an understanding of basic concepts of enzymes.	Familiarity
CO II	To understand the basic mechanism of action and working behaviour of enzymes	Familiarity
CO III	To familiarize the students with various applications of enzymes in laboratory as well as Industrial scale.	Assessment
CO IV	To conceptualize about immobilized enzyme technology, and other specific enzymes and their applications.	Assessment
CO V	To familiarize the students with present potential of enzyme in industrial application and improved activity of the enzyme using various molecular biology techniques.	Usage
COVI	To understand the principle and function of enzyme in various adverse conditions like high temperature and pH(s).	Usage

Topic Covered

S. No.	Contents	Contact Hrs.
1	**Enzymes: Basic concepts** **Introduction** and classification of enzymes, free energy and enzymes, the formation of the transition state, catalytic strategies. **Properties of enzymes**: Enzyme specificity, stability and structure, Factors affecting enzyme activity; effect of pH and Temperature, Substrate and Enzyme concentration.	5
2	**Kinetics of enzymes** **Enzyme kinetics**: Michaelis-Menten kinetics, evaluation of parameters in the Michaelis-Menten equation, 3-D structure of active site, Kinetics of single and bi-substrate enzyme catalysed reactions, Inhibition & its kinetics.	5
3	**Production and purification techniques** **Enzyme preparation techniques**: Sources of enzymes, production, Recovery and purification of intracellular products: cell disruption, chromatographic techniques. Analytical assays of purity level of enzymes.	5

Approved in Academic Council Meeting held on 28 July, 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	**Preparation, Quantification and Industrial applications** **Application of enzymes**: In leather, glucose syrup production, starch and sugar industry, Dairy and food industry, Beverage industry, Textile industry. Industrial enzymes: Cellulase, lipase, esterase laccase amylase, glucose isomerase, protease, xylanase, invertase, peroxidises. Other applications of enzymes in solution: medical applications of enzymes, non-hydrolytic enzymes in current and developing industrial technology.	8
5	**Enzymes: molecular engineering** **Enzyme engineering:** Mechanisms and manifestations of protein denaturation. Strategies for enzyme stabilization: Physical and chemical modifications, Selection, directed evolution and Rational design. Design and construction of mutant enzymes, Enzyme in organic solvents.	5
6	**Immobilization of enzymes using various techniques** **Immobilized-enzyme technology:** Introduction, enzyme immobilization method: Entrapment, carrier-binding and cross-linking method. Medical and analytical applications of immobilized enzymes.	8
7	**Specified Enzymes and applications** Thermozymes, Cold adapted enzymes, Ribozymes, Hybrid enzymes, Diagnostic enzymes, Therapeutic enzymes: Characteristics, principles and applications.	6
	Total Number of Lectures	**42**

REFERENCE & TEXT BOOKS

1. Industrial Biotechnology: Sustainable Growth and Economic Success by Soetaert and Erick J. Vandamme
2. Fermentation and Biochemical Engineering Hand Book by HC Vogel
3. Industrial Biotechnology by J. Thompson
4. Industrial Biotechnology by AS Maturiya
5. Industrial Biotechnology by IS Thakur
6. Review articles from Science Direct, Springer, Wiley and PubMed Publishers

Evaluation Scheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Entire Syllabus
Teacher Assessment	25	Entire Sem	Based on Assignments, quizzes etc.

Approved in Academic Council Meeting held on 28 July, 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	Industrial Enzymes	**(Core Course)**
Course Code	11B1WBT833	
Course Credit	4	
Course Coordinator	Dr. Ashok Kumar	
Pre-requisite	Enzyme production purification and applications	

L	T	P
4	0	0

Course Objectives

The objective of the course is to develop an understanding of important aspects of production and purification of industrially important enzyme and their application in industry.

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	To develop an understanding of basic concepts of enzymes.
CO II	To understand the basic mechanism of action and working behaviour of enzymes
CO III	To familiarize the students with various applications of enzymes in laboratory as well as Industrial scale.
CO IV	To conceptualize about immobilized enzyme technology, and other specific enzymes and their applications.
CO V	To familiarize the students with present potential of enzyme in industrial application and improved activity of the enzyme using various molecular biology techniques.
CO VI	To understand the principle and function of enzyme in various adverse conditions like high temperature and pH(s).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Enzymes: Basic concepts**	Enzymes as powerful and highly specific catalysts, Classification of enzymes, free energy and enzymes, the formation of the transition state, catalytic strategies. General properties: Enzyme specificity, stability and structure, Factors affecting enzyme activity; effect of pH and Temperature, Substrate and Enzyme concentration.	5
	Enzyme Kinetics	Enzyme kinetics: Michaelis-Menten kinetics, evaluation of parameters in the Michaelis-Menten equation, 3-D structure of active site, Kinetics of single and bi-substrate enzyme catalysed reactions, Inhibition & its kinetics.	5
2	**Enzymes: Production and purification**	Enzyme preparation techniques: Sources of enzymes, production, Recovery and purification of intracellular products: cell disruption, chromatographic techniques. Analytical assays of purity level of enzymes.	3
3	**Enzyme preparation and application in industries**	Application of enzymes in leather, glucose syrup production, starch and sugar industry, Dairy and food industry, Beverage industry, Textile industry. Hydrolysis of starch and cellulose. Catalytic functions of Cellulase, lipase, esterase laccase amylase, glucose isomerase, protease, xylanase, invertase, peroxidises. Other applications of enzymes in solution: medical applications of enzymes, non-hydrolytic enzymes in current and developing industrial technology.	10
4	**Enzymes: engineering and improved properties**	Enzyme engineering: Mechanisms and manifestations of protein denaturation. Strategies for enzyme stabilization: Physical and chemical modifications, Selection, directed evolution and Rational design. design and construction of mutant enzymes, Bifunctional and polyfunctional enzyme, Enzyme in organic solvents.	5
5	**Immobilized-enzyme technology**	Immobilized-enzyme technology: Introduction, enzyme immobilization method: Entrapment, carrier-binding and cross-linking method. Medical and analytical applications of immobilized enzymes.	8
6	**Specified Enzymes and applications**	Thermozymes, Cold adapted enzymes, Ribozymes, Hybrid enzymes, Diagnostic enzymes, Therapeutic enzymes: Characteristics, principles and applications.	6
		Total Number of Lectures	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
QAC

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Devasena, T., "Enzymology", 1st ed., Oxford University Press, 2010
2	Berg, J.M., Tymoczko, J.L. and Stryer, L., "*Biochemistry*", 5th ed., W.H. Freeman and Company, New York, 2002.
3	Nelson D.L., Cox M.M., "Lehninger Principles of Biochemistry", 5th ed., W.H. Freeman and Company, New York, 2008.

REFERENCE BOOKS

1	1. Pye, E.K. and Wingard, L.B., "*Enzyme Engineering II*', Plenum Press, 1974.
2	2. Illanes A, "Enzyme Biocatalysis", Springer Science, 2008.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE TITLE: Industrial Plant Tissue Culture **Credits :3**

COURSE CODE: 10B1WBT725 **Lectures :3/week**

COURSE COORDINATOR: Dr Hemant Sood

Objective:

To provide an insight to the students on different aspects of Plant tissue culture technologies their applications and commercialization for providing beneficiaries.

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	20
Attendance	5
Total	100

Course Outcomes:

CO1. To enable students for applying the knowledge about basic techniques of plant tissue culture.

CO2. To apply the learnt techniques for solving constraints linked with Plant product and technologies

CO3. They will learn the strategies for analyzing, upscaling and commercialization of plant based products.

CO4. To enable students for exploring their avenues for entrepreneurship and social welfare

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

CO5 . To apply knowledge of plant biotechnology for effective planning and strategizing of projects

CO6. To be able for developing skills for benefit generation and utilization of techniques of PTC

Course content

Topics	Lecture hrs.
Introduction of plant tissue culture and different commercial set ups	2
Different techniques like organ culture, somatic embryos, haploids , callus and suspension cultures	8
Commercially important products generated through plant cell and tissue cultures	3
Development of Transgenics crops (corn ,maize ,poatao, soyabean etc and concerns	4
Secondary metabolites, classifications and utilities	5
Plant stem cells , their maintenance and products	4
Hydrophonics and Aquaphonics along with their industrial applications	2
Upscaling and Quantification of plant products (Phytochemicals, volatile oils and flovorants)	3
Automation and robotics ,Extra terrestrial plants	3
Production of flavanoids and phenols through cell culture	3
Production of terpenoids ,alkaloids and their pathways	3
Role of metabolic engineering and high throughput techniques for the advancements and plant products production	3

Assignemnts on topics:

Each student should submit assignment in the form of soft copy and ppt on any of the topic

1. Research paper analysis on any topic linked with plant tissue culture and plant biotechnology as per the format announce in the class

or

2. Study of any Plant tissue culture unit national or international working successfully
3. IPTC and its role in economic improvement

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

4. Case studies on any successful set up of IPTC in Pvt. Or Govt
5. Concerns for transgenics: Boom or doom
6. Any business idea for setting unit for commercialization of plant tissue culture as an entrepreneur

Quizes:

There will be two quiz tests conducted each of 10 marks which contain MCQ, fill in the blanks and one word answer.

1. In the last week of September
2. In the Last week of November

T3 assignment:

Mention about the usage ,working and principle of one high through put or advance equipment used in IPTC like Sequencer, GS chromatography, Biolistic advance machine, robotic usage etc. 10marks

Reading and reference books:

Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application (Principles and Practice) by: Karl-Hermann Neumann publisher: Springer

Plant cell and tissue culture for the production of food ingredients By Tong-Jen Fu, Gurmeet Singh, Wayne R. Curtis, American Chemical Society

Tissue Culture for Plant Propagators by R.A. de Fossard

Application of Plant Cell and Tissue Culture to Agriculture and Industry by D.T. Tomes, B.E. Ellis, P.M. Harney,K.J. Kasha and R.L. Peterson

Plant Culture Media, Volume 1,Formulations and Uses

by E.F. George, D.J.M. Puttock and H.J.George

Plant Culture Media, Volume 2,Commentary and Analysis

by E.F. George, D.J.M. Puttock and H.J.George

Micropropagation: Technology and Application by P.C. Debergh and R.H. Zimmerman Kluwer Academic Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

11B1WCI832: Information Retrieval and Data Mining

Course Credit: 3
Semester: VII

Introduction:

Data mining is an interdisciplinary subject, and more appropriately named "knowledge mining from data". However, it is also known as knowledge discovery from data (KDD).

Course Objectives (Post-conditions) Knowledge objectives:

- Good knowledge to Mine Data from Large Amount of Data Sources
- You will be able to compare a two different data set and you can find out which one is better
- You will be able to apply many retrieval techniques on a given document
- You will be able apply some pattern matching algorithm and map the various expected pattern depend upon usage requirements

Application objectives:

Data Mining and Information Retrieval have tremendous advantages in term of their application areas which include; Financial Data Analysis, Retail and Telecommunication Industries, Intrusion Detection and Prevention, Bioinformatics and many more.

Expected Student Background (Preconditions)

Database Management Concepts, Probability and Basic Mathematical Concepts

Topics Outline:

Serial No.	Topics	Hrs
1	Introduction to Data Mining	1
2	Data Preprocessing	7
3	Data Generalization, Data Warehousing, and On-line Analytical Processing	8
4	Association Rule Mining and Frequent Patterns	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Classification and Prediction	4
6	Cluster Analysis	5
7	Introduction to Information Retrieval	1
8	Boolean Retrieval	2
9	Probabilistic Information Retrieval	3
10	Vector Support Machines	3
11	Pattern Matching Algorithm	2
12	Link Analysis	2
	Total Hours = 42	

Text Book(s):

1. Jiawei Han and Micheline Kamber, "Data Mining, Concepts and Techniques", Elsevier 2nd edition.
2. An introduction to Information Retrieval, 2008 Cambridge UP.
3. Thomas H. Corman, Charles E. Leiserson, and Ronald L. Rivest, Introduction to Algorithms,. The MIT Press,England, 1989.

Reference Book(s):

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining ", Pearson Education.
2. Richard O. Duda, Peter E. Hart, David G. Stork , "Pattern Classification", 2nd Edition, Wiley Publication, November 2000.
3. Rijsbergen C. J. ,"Information Retrieval" 2nd edition.

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	INTERNAL	25
		Total Marks: 100

Internal Marks Breakdown:

Assignments: 9 marks (3x3)
Quizzes: 12 marks (3x4)
Regularity: 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

13M1WCI331: Machine Learning

Course Credit: 3

Semester: M.Tech, III

Introduction

The intent of this course is to present a broad introduction to Machine Learning, the study of computing systems that improve their performance with experience, including discussions of each of the major approaches. The primary focus of the course will be on understanding the underlying algorithms used in various learning systems.

The format of the course will be lecture-discussions, assignments and project based. Students are strongly encouraged to participate actively in class discussions.

Course Objectives (Post-conditions)

Knowledge objectives:

On completion of the course students will be expected to:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.
- Be able to read current research papers and understand the issues raised by current research.

Application objectives:

The homework portions of the course are intended to help you apply your understanding of machine learning algorithms and their use in data-driven knowledge discovery and program synthesis. You will design and implement several machine learning algorithms. You will also be able to identify formulate and solve machine learning problems that arise in practical applications. You will have a knowledge of the strengths and weaknesses of different machine learning algorithms (relative to the characteristics of the application domain) and be able to adapt or combine some of the key elements of existing machine learning algorithms to design new algorithms as needed. You will have an understanding of the current state of the art in machine learning and be able to begin to conduct original research in machine learning.

Expected Student Background (Preconditions)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Machine Learning is a mathematical discipline and as such students will benefit from a familiarity with probability theory and linear algebra, as well as some basic programming skills.

Topics Outline:

S NO	Topic	Hrs
1	Introduction: Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation.	2
2	Inductive Classification: The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.	5
3	Decision Tree Learning: Representing concepts as decision trees. Recursive induction of decision trees. Picking the best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity. Occam's razor. Overfitting, noisy data, and pruning.	5
4	Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.	3
5	Rule Learning: Propositional and First-Order: Translating decision trees into rules. Heuristic rule induction using separate and conquer and information gain. First-order Horn-clause induction (Inductive Logic Programming) and Foil. Learning recursive rules. Inverse resolution, Golem, and Progol, Association Rule Mining	5
6	Artificial Neural Networks: Neurons and biological motivation. Linear threshold units. Perceptrons: representational limitation and gradient descent training. Multilayer networks and backpropagation. Hidden layers and constructing	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

	intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.	
7	Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.	5
8	Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies.	5
9	Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.	3
10	Clustering and Unsupervised Learning: Learning from unclassified data. Clustering. Hierarchical Agglomerative Clustering. k-means partitioned clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.	5
	Total Self reading topics: HMM, CRF, GA & Kernel methods	42

References

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077 [It will be used as the main text book; however the inputs will be supplemented with information from elsewhere wherever the same is required}.
2. Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006
3. T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.
4. Ian H. Witten & Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufmann, 1999.
5. S. M. Weiss & C. A. Kulikowski, "Computer Systems that Learn", Morgan Kaufman Publishers, San Fancisco, CA, 1991

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation scheme:

Test 1: 15
Test 2: 25
Test 3: 35
Internal 25 (tentative distribution: quiz=12, Assignment=9, Regularity=4)
Total 100 marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •
IQAC

Medical Image Processing

COURSE CODE: 18B1WEC836

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To introduce various medical imaging modalities.
2. To teach the requirement and development of different blocks of computer aided diagnosis for medical images.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Able to understand different types of medical imaging modalities and would be able to differentiate them with respect to their advantages and limitations.	Familiarity
CO-2	Acquire an ability to analyze and process medical images.	Usage
CO-3	Understand different feature extraction techniques and classifiers used for image classification.	Usage
CO-4	Understand the role of computer aided diagnosis for medical images.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Image Processing:- Acquisition of Images, Image Sampling and quantization; Spatial and histogram based enhancement; Noise modeling, Image restoration. Image transformation.	8
2	Edge Detection and Image Segmentation: Gradient based edge detectors. Intensity thresholding based image segmentation; Region growing and region splitting algorithm; watershed segmentation.	8
3	Medical Imaging Modalities: Working principle, applications and limitations of Computed tomography , X-ray, Magnetic resonance imaging, Ultrasound imaging, and Positron emission tomography; Various Artifacts.	6
4	Image Texture: Types of texture parameters: Statistical analysis of texture (First order statistics and Second order statistics), Grey level co-occurrence matrix, grey-level run length matrix.	8
5	Pattern classification: Supervised and Unsupervised pattern classification, Neural Network classifier, Support Vector Machines.	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6	Case Studies: Pre-processing, Segmentation, Feature extraction, and Classification of medical images.	6
Total lectures		42

Suggested Text Book(s):

1. Chris Solomon, Toby Breckon: Fundamental of Digital Image Processing, 1st Ed., John Wiley & Sons, 2011.
2. Rangaraj M. Rangayyan: Biomedical Image Analysis, 1st Ed., CRC Press, New York , 2004.

Suggested Reference Book(s):

1. RC Gonzalez, RE Woods, Digital Image Processing, 3rd Ed., Pearson Publisher, 2008.
2. Kayvan Najarian, Robert Splinter: Biomedical Signal and Image Processing, 2nd Ed., CRC Press, 2012
3. Tamal Bose: Digital Signal and Image Processing, 1st Ed., John Wiley & Sons, 2003.

Other useful resource(s):

1. http://www.nptelvideos.in/2012/12/digital-image-processing.html (Prof P.K. Biswas, IIT Kharagpur)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Medical Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	2	3	1	2	1	2	2.42
CO-2	3	3	3	3	2	0	0	1	2	3	1	1	1.83
CO-3	3	3	3	3	3	1	1	1	1	2	1	1	1.92
CO-4	3	3	3	3	3	3	2	3	2	2	3	3	2.75
Average	3.00	3.00	3.00	3.00	2.75	1.75	1.25	2.00	1.50	2.25	1.50	1.75	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

MOBILE COMMUNICATION

(Elective Subject)

Course Code:		Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-O

Course Objectives

1. To make students familier with fundamentals of mobile communication systems
2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems
5. As a prerequisite for the course in Wireless LANs

Course Outcomes

1. To make students familiar with various generations of mobile communications
2. To understand the concept of cellular communication
3. To understand the basics of wireless communication
4. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
5. Knowledge of IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
6. Knowledge of 3G mobile standards and their comparison with 2G technologies.
7. To under multicarrier communication systems.
8. To differentiate various Wireless LANs.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Evolution of mobile communication systems. 1G, 2G, 2.5G & 3G systems. IMT2000, FDD, TDD, FDMA, TDMA, CDMA, SDMA. Radio frequency spectrum and communication technology. Block diagram of mobile communication system. Problems of mobile communication: spectrum, propagation. Near far problem.	T S Rapaport: Pages 1-39, Jochen Schiller: Pages 7-15	4
2.	The cellular Concept - Introduction, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trucking and grade of services, Improving coverage & capacity in cellular system	T S Rapaport: Pages 57-93	6
3.	GSM standards and architecture, GSM Radio aspects, typical call flow sequences in GSM, security aspects, GPRS	Jochen Schiller: Pages 96- 120 Raymond Steel: 65-147	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	CDMA standards: Spread spectrum, direct sequence and frequency hop spread spectrum, IS-95 CDMA architecture, forward link and reverse link,cdma2000	Raymond Steel: 205-281 T S Rapaport: Pages 569- 582	8
5.	WCDMA: Frame structure, UTRA FDD, UTRA TDD, UMTS, architecture	Jochen Schiller: 136-155	4
6.	Introduction to WLAN: Infrastructure based and adhoc networks, IEEE 802.11, IEEE 802.11a, IEEE 802.11b. Bluetooth, WiMAX	Jochen Schiller: 201-238, 269-290	8
7.	4G Systems: Introduction to OFDM and MC-CDMA	L. Hanzo, T. Keller: 1-18, 203-217	6
		Total Number of Lectures	**44**

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1) T. S. Rappaport, Wireless Communications, PHI, 2002.

2) Mobile Communication, Jochen Schiller, Pearson.

Reference Books

1) WilliamC.Y.Lee,MobileCellularTelecommunications-Analog&DigitalSystems, Mc.Graw Hill,1995

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

15B1WCI731: Mobile Computing

Course Credit: 3
Semester: VII

Introduction

Mobile Phones have emerged as truly pervasive and affordable information and communication technology platform in the last decade. So there is a growing need for a course which can teach students the skills needed to program and configure mobile devices and networks, enabling them to develop new and exciting applications for existing and emerging hardware technology. The objective of the course is to equip students on the fundamentals of mobile computing and the design mobile services. Learn the issues in mobile computing and communications from the hard- ware and software perspective. Understand the mobile IP stack and mobile web access, technologies and services.

Course Objectives (Post-conditions)

Knowledge objectives:

At the conclusion of the course, following learning objectives are expected to be achieved:

1. Introduce enabling technologies of pervasive computing.
2. Acquire solid knowledge on mobile networks and mobile computing.
3. Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
4. Understand the concepts of Adhoc and wireless sensor networks.
5. Understand the concepts of Mobile IP.
6. To be able to analyze the performance of different handoff, roaming, and location update algorithms for cellular networks.
7. Awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior.
8. Describe the possible future of mobile computing technologies and applications.

Application objectives:

At the conclusion of the course, following learning objectives are expected to be achieved:

- Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
- Develop Android specific applications
- Develop Windows specific applications
- To be able to analyze the performance of different handoff, roaming, and location update algorithms for cellular networks.

Expected Student Background (Preconditions)

Students are expected to have a solid grasp of the introduction to computer programming.

Topics Outline:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

S NO	Topics	Hrs
1.	Introduction to Ubiquitous Computing	1
2.	Introduction to Android Operating system • Introduction to the emerging technology • Architecture • Installation Setup • The Activity Class • The Intent Class • Permissions • Creating the UI • Storing and Retrieving Data • User Notifications • Broadcast Receivers • Networking • Location and maps • Sensors	9
3.	Introduction to Windows Operating Systems • Architecture • Installation Setup • Introduction to XAML • Understanding the Navigation Model • Understanding the apps lifecycle and managing states • Building UI • Sensors • Storing and Retrieving data	9
4.	Mid Sem project demo	1
5.	WiFi • Physical Layer • Channel Coding • How the physical layer works • Link Layer MAC Protocols • Link Adaption Protocols • Energy Efficiency in WiFi • Cellular Systems	6
6.	Mobile IP • Mobility in Network Layer • Internet protocols for Mobile Applications • Single Hop Mobility • Mobile IP and Issues	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	• Handoff Issues	
7.	Routing • Routing Protocols in MultiHop Networks • MultiHop routing metrics	3
8.	MANET	2
9.	Student presentations on Emerging New Technologies in Mobile Computing Area	4-5
10.	End Sem Project Demo	2
	Total	42

References

1) Beginning Android Application Development by Wei-Meng Lee, Wiley Publication
2) Windows Phone 8 Development Internals by Andrew Whitechapel, Sean McKenna
3) Handbook of wireless networks and mobile computing by Ivan Stojmenovi
4) An Overview of Routing Protocols in Mobile Ad-Hoc Network by Dr.S.S.Dhenakaran, A.Parvathavarthini
5) Professional Android Application Development by Reto Meier, Wiley publication
6) Windows Phone 8 Guide for Android Application Developers by Microsoft Open Technologies, Inc.
7) Wireless Communications and Networks by William Stallings, Second Edition

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	9 marks (3x3)
Quizzes	12 marks (3x4)
Regularity	4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

10B1WCI735: Cryptography and Network Security Techniques

Course Coordinator: Prof. Dr. S.P.Ghrera, FBCS(Fellow British Computer Society), SMIEEE Ph. D(CSE), MBA(HR & IR), ME(Hons) Computer Science, B Sc Engineering(Hons)

Course Structure: 3 Credits(3L)

Prerequisites: Introduction to Computers
Knowledge of Computer Networks

Note: **This course will be a prerequisite for Network Management Course to be offered in 8th sem.**

Objectives:

1. Understand the basic security services e.g.Authentication, Access Control, Confidentiality, Integrity, and Non repudiation.
2. Understand the concepts of risk, threats, vulnerabilities and attack.
3. Know the important ethical and legal issues to consider in computer security.
4. Know the goals of end-to-end data security. [Familiarity]
5. Understand the role of random numbers and prime numbers in security.
6. Learn standard symmetric encryption algorithms[Assessment]
7. Learn the architecture for public and private key cryptography and how public key infrastructure (PKI) supports network security.
8. Learn the methods of digital signature and encryption.
9. Learn key management and how key exchange protocols work.
10.Learn security protocols at different layers of Network layer heirachy.
11.Learn futuristic cryptographic techniques like Eliptic Curve and quantum cryptography.
12.Learn the concept of trusted computing.
13.Learn the Web security Protocol.
14.Learn thelegal aspects of Cyber Laws.

Learning Outcomes: After completing this course, students will be able to:

1. Explain common attacks against network assets, the associated threats and vulnerabilities, and what network security personnel do to secure assets.
2. Explain how to use cryptography to help protect information and how to choose an appropriate encryption method for an organization.
3. Help protect information in an organization by using authentication and access control.
4. Deploy and manage certificates.
5. Help protect transmission of data by identifying threats to network devices and implementing security for common data transmission, remote access, and wireless network traffic.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

6. Help protect Web servers against common attacks and configure security for Web browsers.
7. Help protect e-mail messages and instant messaging from common security threats.
8. Identify common security threats and vulnerabilities to directory services and DNS, and then apply security methods to help protect them.
9. Identify network perimeter threats and monitor perimeter security for a network.
10. Identify types of security policies to manage operational security, and then use these policies to ensure compliance by users in an organization.
11. Preserve business continuity by implementing a security-enhanced disaster recovery strategy, communicating risks to others, and performing secure backup and recovery.
12. Identify, respond to, and assist in the formal investigation of security incidents.
13. Implement security-enhanced computing baselines in an organization.

Course Text: "Cryptography & Network Security" by Stallings, William (Fourth Edition or later) will be used as the main text book, however the inputs will be supplemented with information from elsewhere wherever the same is required.

Course Outline:

S.No.	Topics	Chapter	Lectures
1	Foundation of Security & Cryptography: OSI security architecture, Security Policy,Classical encryption techniques(Substitution Techniques, Transposition Techniques and Staganography)	1,2	3
2	Mathematical Tools for Cryptography: Finite fields, number theory	4,8	1
3	Design Principle of Block Ciphers:DES	3	2
4	Block Cipher Algorithms: AES	5	3
5	Pseudo Random Numbers & Stream Ciphers: Multiple Encryption, Block Cipher modes of operation, stream ciphers, Confidentiality	6,7	4
6	Public Key Cryptography: RSA, Key management	9,10	4
7	Hashes & Message Digest:Authentication functions,Message authentication codes,Hash functions and their security	11,12	4
8	Digital Signature, Certificates & standards	13	3
9	Authentication:X.509 Authentication service	14	3
10	Electronic Mail Security:S/MIME	15	3
11	IP and Web Security Protocols:IPsec, Secure	16,17	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	socket layer and transport layer security, secure e-transaction.		
12	System Security : Computer Virus, Firewall & Intrusion Detection , Trusted systems, Security Investigation/Audit	18,19,20	4
13	Cyber Laws: IT ACT 2000, IT amendment ACT 2008		3
	Total		42

Evaluation Scheme:

Test 1	15
Test 2	25
Test 3	35
Attendence, Assignments etc	25(quiz=12,Assignment=9,Regularity=4)
Total	100

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Peptide Therapeutics

COURSE CODE: 18B1WBT631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: General Chemistry

Course Objectives:

1. To develop an understanding of important concepts and design aspects of peptides
2. To learn various therapeutic applications of peptides.
3. Apply basic knowledge to design peptides for various therapeutic purposes

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand various peptide design consideration and other important structural aspects of peptides	Familiarity
CO-2	Able to understand and learn the concept of solid phase peptides synthesis	Familiarity
CO-3	To develop methods of peptides and proteins for their quality control and apply them in handling Therapeutic peptides and proteins	Assessment
CO-4	To understand the mechanism of action of Antibiotic, Anticancer, Antihypertensive and Opioid peptides	Usage
CO-5	To develop a strong foundation therapeutic peptide design and their applications	Usage

Course Contents:

Unit	Contents	Lectures required
1	Peptides, synthetic peptides & their classification based on structure, engineering bioactive peptide based therapeutic molecules,	7
2	Principle and practice of solid phase peptide synthesis, solid support, protection scheme, peptide acid and amide, Purification of peptides, quality control of peptides	7
3	Antimicrobial host defense peptides, Anticancer peptides, Opioid Peptides, Antihypertensive Peptides, Peptides in clinical trial ,chemical biology of Oxytocin, valinomycin and enkephalins	18
4	Preformulationstudies, Formulation development, Aggregation in protein formulation, novel formulation approaches, Lyophilization, Pharmaceutical Processing, and Handling of Therapeutic Peptides and Proteins	6
5	Circular dichroism, UV, IR, Mass and fluorescence spectroscopy of peptides	4
	Total lecture	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 25.10.2018

Suggested Text Book(s):

1. Ajay K Banga, "Therapeutic peptides and protein: formulation processing and delivery system, Second edition, Taylor and Francis.
2. Lehninger Principles of Biochemistry Cox, M.M. and Nelson, D.L. and Lehninger A. L. 4th edition.
3. Biochemistry- J.M. Berg, J.L.Tymoczko, and LubertStryer; 5th edition W.H. Freeman and Company, New York, USA.

Suggested Reference Book(s):

1. Gregory A. Grant, "Synthetic peptides A Users Guide" 2nd ed. W. H. Freeman and Company

EvaluationScheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Peptide Therapeutics	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	1	-	-	2	3	3	3	1.92
CO-2	2	3	3	3	2	2	-	-	2	3	3	3	2.17
CO-3	3	3	3	3	3	2	-	-	2	3	3	3	2.33
CO-4	3	3	2	3	3	2	-	-	2	3	3	3	2.25
CO-5	3	3	2	3	2	2	-	-	2	3	3	3	2.17
Average	2.60	3.00	2.40	2.80	2.40	1.80	0.00	0.00	2.00	3.00	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Python Programming Essentials

COURSE CODE: 18B11CI314

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Provide an understanding of the role computation can play in solving problems.
2. Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
3. Position students so that they can compete for research projects and excel in subjects with programming components.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Familiarity about concepts of Python Programming. Broaden the knowledge about Variables, expressions and Functions in Python.	Familiarity
CO-2	Broaden the knowledge about Branching and Iteration. To have hands on skills on String Manipulation, Guess and Check, Approximations, Bisection	Assessment
CO-3	To learn about Decomposition Abstractions, Tuples, Lists, Dictionaries and Illustrative programs:	Assessment
CO-4	Files, Modules, Packages and Testing, Debugging, Exceptions, Assertions:	Usage
CO-5	Understanding and analyzing Object Oriented Programming:	Familiarity
CO-6	To have hands on skills on Illustrative programs(examples Sorting and Searching, Regular expressions) and GUI	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Informal introduction to Python programming language:** What is a program?, What is debugging?, Formal and natural languages, Downloading and installing Python., The first program, Debugging **Variables, expressions and Functions in Python** Values and types, Variables, Variable names and keywords, Operators and operands, Expressions and statements, Interactive mode and script mode, Order of operations, String operations, Function calls, Type conversion functions, Math functions, Composition, Adding new functions, Definitions and uses, Flow of execution **Parameters and arguments**	5
2	**Branching and Iteration:** Loops, Multiple assignment, Updating variables, The while statement, Break **String Manipulation, Guess and Check, Approximations, Bisection:** String manipulation, Guess and check algorithms(e.g: find Square Root etc), Approximate solutions(e.g	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

	Successive approximation), Bisection method.	
3	**Decomposition, Abstractions:** divide and conquer (modules), Abstraction **Tuples, Lists, Dictionaries, Illustrative programs:** - Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; - Tuples: tuple assignment, tuple as return value; - Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram	7
4	**Files, Modules, Packages:** Files and exception: text files, reading and writing files, format operator, Packages, Illustrative programs: word count, copy file. **Testing, Debugging, Exceptions, Assertions:** Unit testing framework(unit test), debugger for Python program(pdb), Handling an exception	7
5	**Object Oriented Programming:** -Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects -OOP, continued: inheritance, polymorphism, operator overloading, abstract classes.	7
6	**Illustrative programs(examples):** • Sorting and Searching • Regular expressions ○ Match function ○ Search function ○ Matching vs. Searching ○ Modifiers ○ Patterns **GUI :** Introduction, Tkinter programming, Tkinter widgets	8
Total lectures		**42**

Suggested Text Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705

Suggested Reference Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc18_cs35/preview
2. https://nptel.ac.in/courses/106106145/

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm
4. https://docs.python.org/3/tutorial/index.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	*T-1	15	1 Hour.	Syllabus covered up to T-1
2	#T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	ST-3	35	2 Hours	Entire Syllabus
4.	~Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

*In Test-I Paper the 20% of 15 Marks will be allocated to Introduction to Computers portion and 80% of 15 Marks will be allocated to Introduction to Programming portion.

#In Test-II Paper the 20% of 25 Marks will be allocated to syllabus of Test-I and 80% of 25 Marks will be allocated to further covered portion.

$In Test-III Paper the 40% of 30 Marks will be allocated to syllabus of Test-I+ Test-II and 60% of 30 Marks will be allocated to further covered portion.

~Internal Assessment will purely be focused on the assignments and quizzes based on Python Programming.

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Python Programming Essentials)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	3	3	2	1	1	1	3	2.1
CO-2	3	3	3	1	2	3	3	3	2	1	1	3	2.3
CO-3	3	3	3	1	2	3	2	3	2	1	1	3	2.3
CO-4	3	3	3	3	3	3	3	2	2	1	1	3	2.5
CO-5	3	3	3	2	2	3	3	3	2	1	1	3	2.4
CO-6	3	3	3	2	3	2	3	2	2	1	1	3	2.3
Average	3	2.8	3	1.7	2.3	2.8	2.8	2.5	1.8	1	1	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

17B1WHS731 QUALITY MANAGEMENT

Course Goal

Quality management is a system that serves to control Quality in the critical activities of an organization by bringing together resources, equipment, people and procedures. It uses techniques and principles such as quality function deployment, Taguchi method, service quality management, quality audits and Six Sigma to control quality in every sphere of activity in an organization.

Course Objective

1. Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
2. Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
3. Critically appraise the organisational, communication and teamwork requirements for effective quality management
4. Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans

Detailed Syllabi

Lecture-wise Breakup

Subject Code	17B11WHS731	**Semester**	8
Subject Name	Quality Management		
Credits	3	**Contact Hours**	3

Module No.	Subtitle of the Module	Topics	No. of Lectures

Unit	Contents	Topic	Hrs
1	The Engineer and QM link	Introduction The engineer as a specialist The failure of engineering: educational systems: The UK experience	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		The new breed of engineers Engineers' competences and the role of QM The evolution of engineers for Total Quality Management The engineer in a QM environment	
2	Pioneers of QM	How old is the quality concept? Why are the Japanese leading the field of quality? How the West has woken up to the importance of quality WE Deming ,Joseph M Juran , Philip B Crosby , Armand V Feingenbaum ,Bill Conway ,Kaoru Ishikawa, Genichi Taguchi , Shigeo Shingo, W G Ouchi	3
3	**Total Preventative Maintenance for QM**	Introduction What is quality? Some quality characteristics The quality processes What is meant by Quality Control? What is meant by Statistical Quality Control? What is meant by Total Quality Control? What is meant by Quality Assurance? What is meant by Quality Management? Some examples of QM models , QM - a boardroom place QM and productivity QM and Advanced Manufacturing Technology	3
4	QM	The meaning of quality systems . Why are Quality Assurance systems needed? The role of quality standards. The different stages of a quality assurance system . The implementation of quality systems . The ISO 9000 quality system British Standard BS *5750/IS0* 9000 . Registration and accreditation in quality systems	4
5	**QM: Tools and Techniques**	Introduction . Why use tools and techniques in QM? How do we define processes? Process variation and its causes . What are the tools and techniques for QM? Process capability. The implementation of Statistical Process Control	4
6	Total Preventive QM techniques	Introduction . What is TPM? Failure patterns . Costs and benefits of TPM Some examples of TPM implementation Towards Zero Defect: Zero Breakdown Implementing TPM: Some guidelines	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

7	**Continuous Process Improvement- #TQM, Besterfield**	Juran Triology, Improvement Strategies , Types of Problems, The PDCA cycle, Problem solving Methods, Kaizen, Reengineering	**4**
8	**Leadership And Strategic Planning #TQM, Besterfield**	Leadership theory and practices, Creating the leadership system, Strategic Planning, leadership, strategy and organization structure, leadership for Quality ; The Seven Management And Planning tools.	**4**
9	**Essentials of QM**	Introduction Internal customer-supplier chains External customer-supplier chains From customer satisfaction to customer commitment from a win-lose to a win-win situation Towards single sourcing-supplier chains The power of communications in customer-supplier chains.	**3**
10	**Principles of Six Sigma #The Management and Control of Quality, Evans Lindsay**	The statistical basis of Six Sigma ; Six Sigma Problem Solving (The DMAIC Methodology ; Tools and Techniques; Design for Six Sigma Six sigma in services and small organizations Six Sigma and Lean Production Lean Six sigma and Services	**3**
11	**Benchmarking**	Define benchmarking, Reasons to benchmark Process, Deciding what to Benchmark, Pitfalls and criticism of Benchmarking	**5**
	Total Hours		**42**

Methodology

The course will be taught with the aid of lectures and case studies. Lectures are combined with hands-on practice and discussion in class. . The students will be provided with research papers which they will analyze and study to further strengthen their understanding of the topics. Students need to read in advance case studies in order to be able to answer the questions. Groupwork outside the classroom is also needed for the students to formulate a strategy for an assigned company.

Evaluation Scheme

Exam	Marks
Test 1	15
Test 2	25
Test 3	35
Case study\presentation	20
Assignment	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Recommended Reading (Books/Journals/Reports/Websites etc	
1.	Dale H. Besterfield, Pearson, *Total quality Management*, Pearson Education
2.	Evans's. James, Lindsay M. William , *The Management and Control of Quality*, Cengage Learning
3.	H.Lal, Lt. Gen ,Wiley Eastern Limited, 1990 , *Total Quality Management*
4.	Bounds Greg , McGraw , *Beyond Total Quality Management*
5.	Kanishka Bedi, Oxford Higher Education, *Quality Management*
6.	**http://www.evans.swlearning.com**
7.	**www.cengage.com/international**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Robotic Systems and Control

COURSE CODE: 18B1WEC737

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Differential equations and Linear algebra, knowledge of Control Systems

Course Objectives:

1. The Robotics' chief objective has always been associated with working for new and updated technologies for example embedded systems, microcontrollers and VLSI.
2. To use the robotic system for logic building & programming and to solve many engineering problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Students will be equipped with the automation and brief history of robot and applications.	Familiarity
CO-2	Students will be equipped with the principles of various sensors, actuators and their applications in robots.	Assessment
CO-3	Be able to analyze any physical system using mathematical model.	Assessment
CO-4	Be able to do the path planning on robotic systems using various control strategies.	Assessment
CO-5	Students will be equipped with the simulation and hands on robotic kits	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Robotics: Introduction – brief history, types, classification and usage, Science and Technology of robots, textbooks and research journals, introduction to simulation environment.	3
2	Elements of Robots -- joints, links, actuators, and sensors: Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force- torque sensors, proximity and distance measuring sensors, and vision.	10
3	Robot Arm Kinematics and Dynamics: forward kinematics, Inverse kinematics, Lagrange formulation of dynamics	8
4	Motion Planning and Control: Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators	10
5	Modeling and Control of Flexible Robot Manipulators: Models of flexible links and joints, Kinematic modeling of multi-link flexible robots, Dynamics and control of flexible link manipulators, Numerical simulations studies	6
6	Robot Programming: MATLAB and other simulation platforms, Hands on experiment on robotic kits, working and implementing various Ad-on modules.	5
Total lectures		42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. J. J. Craig, "Introduction to Robotics- Mechanics and Control", Pearson, 3rd Edition, 2009.
2. Spong and Vidyasagar, "Robot Dynamics and Control", Wiley Student Edition, John Wiley and Sons, 2013.

Suggested Reference Book(s):

1. Sciavicco and Siciliano, "Modeling and Control of Robot Manipulators", Springer, 2nd Edition, 2002.
2. D.K. Pratihar, "Fundamentals of Robotics", Narosa Publishing House, 1st Edition, 2017.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/112101099/
2. Other links to course material: https://nptel.ac.in/downloads/112101098/
3. Material provided by IIT Bomaby under eLSI project

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Robotic Systems and Control)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	2	2	1	1	1	2	3	3	1.9
CO-2	3	3	3	2	3	2	1	1	1	1	2	3	2
CO-3	3	3	3	3	3	3	2	1	3	2	2	3	2.6
CO-4	3	3	3	3	3	3	2	1	2	2	3	3	2.5
CO-5	3	3	3	3	3	3	2	1	2	1	2	3	2.4
Average	3	3	2.8	2.6	2.8	2.6	1.6	1	1.8	1.6	3	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CODE:13P1WHS137

SERVICE MARKETING

Credits 3

Lectures 3 Tutorials 0 Practical 0

Pre-requisites: None

Objective: This course examines the important and growing role services marketing plays in both consumer and organizational target markets. Discussing current issues in services marketing and customer service strategies, this course focuses on effective customer relationship management; key service delivery elements; and service recovery strategies that lead to the successful implementation of a customer focus in service-based businesses.

Course Assessment:

Mid Term Test	30
End Term Test	45
Teacher Assessment	25
Total	100

Course Outcomes:

At the end of this course, the student can explain the unique challenges of services marketing, including the elements of product, price, place, promotion, processes, physical evidence, and people; describe how customer relationship marketing (CRM), including retention strategies, creates an environment that achieves excellence in customer service and design service quality measurements to build customer loyalty and evaluate the effectiveness and efficiency of customer service offerings.

Topics Covered:

Understanding service products, consumers, and markets: (Positioning Services in Competitive Markets; Consumer Behavior in a Services Context; New Perspectives on Marketing in the Service Economy)
Applying the 4ps of marketing to services: (Promoting Services and Educating Customers; Distributing Services through Physical and Electronic Channels' Developing Service Products: Core and Supplementary Elements)
Managing the customer interface: (Managing People for Service Advantage; Crafting the Service Environment ; Designing and Managing Service Processes)

Text Books

Christopher H Lovelock and Jochen Wirtz: Services Marketing: People, Technology, Strategy, 4/E Prentice Hall (2001)

Reference books

1 .K. Douglas Hoffman, John E. G. Bateson: Services Marketing: Concepts, Strategies, & Cases: Concepts, Strategies, and Cases. Cengage Learning, (2010)

2. Zeithaml: Services marketing Tata McGraw-Hill Education, (1996)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Name: Software Agents

Course Code: 11B1CI731

Course Coordinator: Dr. Yugal Kumar

Prerequisites

Software Engineering, Unified Modelling Language (UML)

Post-courses

Software Systems, Advanced Software Engineering

Objectives

The aim of the course is to introduce the student to various software agents tools and learning to automate a system that will take decisions independently. The student learns about software agent's fundamentals, describes the main characteristics of agents, how they react to user oriented architectures, representing the goal driven methodology, implementing agents with tools like Prometheus and GAIA, working with predicate logic to establish language for agents, providing multi-agent decision making methodology, developing multi-agent systems like JACK, plan based semantics and standards for communication among software agents. The student will be exposed to dealing with software agent's architectures and softwares through various tools with the help of predicate logics.

Learning Outcomes

The students shall deepen the generic skills to design and implement software agents, software agent's tools, architectures for a broad-based set of user-computer and automating systems in various domains.
The course will use the mixed technique of interactive lectures, guided case studies, literature survey, regular assignments and project work. In addition to the material covered in the class, students will be required to explore, study, evaluate, present several agent tools. Teaching in this course is designed to engage the students in active and experiential learning by taking a problem solving and design oriented approach with special emphasis on real world applications. Lectures will be highly interactive and work oriented. Students will have to work individually as well as in groups inside as well as outside the class. Each student is also expected to choose a topic from the list provided. There should be a report component, on the order of 10 pages, let's say in the range 5-20 pages and they will give a presentation about their project.

Syllabus and Lecture Plan	
Introduction to Software Agents: Software Agents, Trends in Agents, Multi-Agent Systems, Vision, Spacecraft Control, Autonomous Agents, Air Traffic Control, Internet Agents	3
Intelligent Agents: Agents, Reactive Agents, Proactive Agents, Social Ability, Agent and Objects, Agent and Expert Systems, Environments for Agents, Intentional Systems	4
Predicate Logic: Predicate Logic, First Order Logic, Representing Relationaship, Reasoning, Conversion to Clause Form	3
Abstract architectures for agents: Agent Architectures, Reasoning Agents, Blocks World, Green's Method, Unstack, Frame and Axioms, Practical Reasoning Agents, STRIPS Idea, BDI Architecture, Practical reasoning Agents, Prcedural Reasoning System, Rodney Brooks, Subsumption Architecture, Free-flow Architecture, Hybrid Agents, Horizontally/Vertically Layered Architecture	6
Multi Agent Decision-Making: Multi-Agent Systems, Utility, Multiagent Encounters, Raional Action, Payoff Matrices, Dominant Strategies, Nash Equilbrium, Prisoner's Dilemma, Axelrod's Tournament,	4
Agent Oriented Software methodologies like Prometheus, Gaia, Agent UML andothers, Using Prometheus Design Tool (PDT): AOSE Introduction, Agent based Approach, GAIA, Tropos, Prometheus Methodologies, Formal Methods for AOSE, Agent based Systems,	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Prometheus Design Tool (PDT), Prometheus Methodology, Agent oriented Programming, Agent UML, Class Diagram, Interaction Diagram	
Reaching Agreements, Developing Multi Agent Systems usingJACK: Reaching Protocols, Meachanisms and Strategies, Auctions, Auction parameters, Vickrey Auctions, Lies and Collusion, Task Oriented Domain, Negotiation Protocols, Zeuthen Strategy,	4
Agent Communication, Standards for Agent Development like FIPA: Agent Communication, Speech Acts, Plan based Semantics, Knowledge Interchange Format, Foundation for Intelligent Physical Agents (FIPA)	4
Agent Communication Standards (Working Together): WorkingTogether, Benevolent Agents, Self-Interested Agents, Task/Result Sharing, Contract Net, Cooperative Distributed Problem Solving, Domain Specific Evaluation, Types of Messages, Node and their Roles, Hearsay II Speech Understanding System, Blackboard Architecture, Internode Communication, Domain	6
Agent Support Technologies/Methodologies: Pitfalls of Agent Development, Generic Solutions to 1-Off Problems, Confuse Prototypes with Systems, Don't Exploit Related Technology/Concurrency, Generic Architecture, Implementing Infrastructure, Mobile Agents, Security for Host/Agents, Telescript, TCL/TK and Scripting Languages,	4
Total Hrs.	**42**

Evaluation Scheme

Evaluation scheme is designed to promote and test higher level thinking skills through holistic and continuous evaluation and de-emphasis rote learning. Written exams will be designed and conducted as close/open book(s), close/open notes tests. One of the minor tests will be designed and conducted as a take home test and will be based on individual's research and literature survey. Evaluation scheme will have following components:

T1	15	
T2	25	
T3	35	
Teachers Assessment	25	(i, ii, and iii)
(i) Mini Project	10	
(ii) Quiz and Assignment	10	
(iii) Attendance	5	
Total	100	

Reference Material

1) Jeffrey M. Bradshaw: Software Agents
2) MIT Press: Software Agents
3) Jeffrey M. Bradshaw: Software Agents (American Association for Artificial Intelligence)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	Stem Cells and Regenerative medicines	**(Core Course)**
Course Code		
Course Credit	3	
Course Coordinator	Dr. Udayabanu, M.	
Pre-requisite	Basic understanding of biology and cell culture	

L	T	P
3	0	0

Course Objectives

The objective of the course is to develop an understanding of important concepts and design aspects of bioreactors and their functioning and scale up.

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	Able to understand current medicine therapy and embryonic stem cell
CO II	Able to understand different tissues and adult stem cell
CO III	Able to understand heart, muscle and neural stem cells
CO IV	Able to understand regenerative medicine and application of stem cells
CO V	Able to understand tissue engineering

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction	Overview of current medicine and therapy, introduction to stem cells, and regenerative therapy. Totipotency, pluripotency, multipotency, progenitors, etc. Different types of stem cells –embryonic , adult stem cells, induced pluripotent cells (iPSCs), localisation, niche, etc.	4
2	EMBRYONIC STEM CELLS, NUCLEAR REPROGRAMMING, AND STEM CELL FATE	Development of Diverse Hematopoietic Cell Populations from Human Embryonic Stem Cells Using Embryonic Stem Cells as a Model of Pancreatic Development Isolation and culture of mesenchymal stem cells	8
3	ADULT STEM CELLS	Introduction to different tissues and systems of human body. Multipotent Adult Progenitor Cells, localisation and stem cell proliferation. Neural stem cells, bone marrow cells, Ocular Surface Epithelial Stem Cells, etc	4
4	STEM CELLS FOR MUSCLE AND HEART	Stem Cells in Skeletal Muscle Regeneration, Myogenic Precursor Cells in the Extraocular Muscles, Treating Coronary Heart Disease with Progenitor-Cell-based Repair, Postnatal Stem Cells for Myocardial Repair.	6
5	STEM CELLS FOR THE NERVOUS SYSTEM	Use of a β -Galactosidase Reporter Coupled to Cell-Specific Promoters to Examine Differentiation of Neural Progenitor Cells In Vivo and In Vitro From Neural Stem Cells to Neuroregeneration Cochlear Stem Cells/Progenitors Intravascular Delivery Systems for Stem Cell Transplantation in Neurologic Disorders Stem Cell Strategies for Treating Inner Ear Dysfunction	9
6	Regenerative Medicine	Regenerative Medicine : Overview, Gene therapy, regenerative medicine, Bioprinting, Stem Cells and Regenerative Medicine in diseases, Genetic Reprogramming	4
7	Tissue Engineering	Tissue engineering overview, Cells and Biomaterials : The Tissue engineering Approach, An overview of various Scaffolds, Regulation of cell function in tissue engineering, scaffold fabrication techniques, Bioreactor in Tissue Engineering, Transplantation Immunology: Organ and Tissue Transplantation Immunosuppressive Agents, Immunosuppressive Therapy	7
		Total Number of Lectures	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Krishnarao Appasani and Raghu K. Appasani, Stem Cells & Regenerative Medicine, Humana Press
2	Walter C. Low and Catherine M. Verfaillie, Stem Cells and Regenerative Medicine, World Scientific Publishing Co. Pte. Ltd USA (2008)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Underground Technology

COURSE CODE: 10B13CE736

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Geotechnical Engineering and Foundation Engineering

Course Objectives:

1. To impart the knowledge of recognizing the diversity and complexity of underground excavation sand associated works such as foundation construction.
2. To provide guidance for support selection of underground openings which is dependent upon the ground conditions, excavation size and shape and excavation method employed.
3. To inculcate the understanding of ground improvement and develop knowledge of different ground improvement techniques.
4. To understand, analyze and design flexible retaining structures
5. To provide knowledge of tunneling and various aspects of tunnel engineering.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the conditions and structures required for underground structure.	Familiarity
CO-2	Stabilize excavation for underground construction using sheet piles, anchored bulkheads, management of ground water conditions and apply dewatering methods.	Assessment
CO-3	Design and understand the construction methodology of deep foundation, analyze side - support systems for underground excavations.	Assessment
CO-4	Solve problems related to required ground conditions, side – support system, lining and design tunnels with its various components.	Usage
CO-5	Understand the construction methodologies for side - support system required for underground excavation , coffer dams, caissons, wells, basement and tunnel construction.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction**: Introduction to various underground structures. Underground construction methodology & equipments.	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

2	**Underground construction**: Excavations, soil support methods, diaphragm walls, reinforced earth.	5
3	**Ground Water management**: Management of groundwater, dewatering methods Coffer dams, Caisson & wells.	6
4	**Permanent Support and Temporary Support system**: Methods of Basement construction, bracing system.	8
5	**Ground Improvement**: Grouting, In – situ Densification: Preloading, Compaction Grouting, Dynamic Compaction, Blast densification, Vibro–Compaction and Vibro–Replacement, Compaction piles, Reinforcement of embankments and foundations.	6
6	**Tunnels**: Introduction, Tunnel stabilization and lining, Cut and Cover Tunnels, Bored Tunnels, Immersed Tube Tunnels, Water Conveyance Tunnels, Micro-tunnels.	6
7	**Underground Conduits**: Ditch Conduits, Positive Projecting Conduits, Negative Projecting Conduits, Imperfect Ditch Conduits, Tunneled Conduits.	6
Total lectures		**42**

Suggested Text Book(s):

1. Geotechnical Engineering by Gulati and Dutta(TMH)
2. Tunnel Engineering Handbook edited by Bickel, Kuesel andKing

Suggested Reference Book(s):

1. Foundation Engineering Handbook, edited by Winterkorn &Fang
2. Construction technology by Roy Chudley& RogerGreen
3. Advance Construction Technology by Roy Chudley& RogerGreen
4. Railway Bridges and Tunnels by Vazirani andChandola

Other useful resource(s):

1. Link to NPTEL course content:https://nptel.ac.in/courses/105103093/24
2. Links related to topics of course:https://nptel.ac.in/courses/10510 8069/5 https://freevideolectures.com/course/3269/advanced-foundation-engineering/25https://nptel.ac.in/courses/105106055/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Underground Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	1	2	2	0	3	3	1	1	**2.0**
CO-2	2	3	3	2	2	3	2	1	2	1	1	3	**2.1**
CO-3	3	2	2	2	1	3	1	1	2	2	2	3	**2.0**
CO-4	3	3	3	2	2	3	2	2	1	1	1	2	**2.1**
CO-5	3	3	3	2	0	2	1	1	2	1	2	3	**1.9**
CO-6	2	2	2	2	1	3	3	0	3	2	2	3	**2.1**
Average	**2.67**	**2.5**	**2.67**	**2.17**	**1.17**	**2.67**	**1.83**	**0.83**	**2.17**	**1.67**	**1.5**	**2.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Big Data

COURSE CODE: 18B1WCI844

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: **None**

Course Objectives:

1. To learn the basic concepts and terminology in big data analytics
2. To learn about the map reduce and the new software stack
3. To learn about the mining of data streams, estimating moments and windowing, link analysis: page rank and efficient computation of page rank
4. To learn concepts associated with frequent item sets from big data and counting frequent items from stream
5. To learn about clustering for big data and mining of social network graph
6. To learn about recommendation systems, collaborative filtering and dimensionality reduction

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in big data analytics	Familiarity
CO-2	To learn about the map reduce and the new software stack	Familiarity
CO-3	To learn about the mining of data streams, estimating moments and windowing, link analysis: page rank and efficient computation of page rank	Assessment
CO-4	To learn concepts associated with frequent item sets from big data and counting frequent items from stream	Assessment
CO-5	To learn about clustering for big data and mining of social network graph	Assessment
CO-6	To learn about recommendation systems, collaborative filtering and dimensionality reduction	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Big Data: Big data time line, Why this topic is relevant now? Is big data fad? Where using big data makes a difference? Introduction to statistical modelling and machine learning. Ordinary data processing versus big data processing: Challenges and opportunities	5
2	Map Reduce and the New Software Stack: Distributed File Systems, Map Reduce, Algorithms Using Map Reduce, Complexity Theory for Map Reduce	6
3	Mining Data Streams: The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments and Windowing, Decaying Windows	8
4	Link Analysis: Page Rank and Efficient Computation of Page Rank, Topic-Sensitive Page Rank, Link Spam, Hubs and Authorities	8
5	Frequent Item sets from Big Data: The Market-Basket Model, Market Baskets and the A-Priori Algorithm, Handling Larger Datasets in Main Memory, Limited-Pass Algorithms,	8

	Counting Frequent Items in a Stream	
6	Clustering for Big Data: Introduction to Clustering Techniques, Hierarchical Clustering, Clustering in Non- Euclidean Spaces, Clustering for Streams and Parallelism	7
Total lectures		**42**

Suggested Text Book(s):

1. Anand Rajaraman and Jeffery David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012

Suggested Reference Book(s):

1. Jared Dean, Big Data, Data Mining and Machine Learning, Wiley Big data Series, 2014
2. Judith Hurwitz, Alan Nugent, Fern Halper and Marica Kaufman, Big Data for Dummies, Wiley Press, 2013

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106106142/
2. Link to topics related to course:
   h. http://www.dbta.com/Columns/Big-Data-Notes/
   i. https://people.cs.kuleuven.be/~joost.vennekens/DN/bigdata.pdf
   j. https://www.tutorialride.com/big-databases/big-database-tutorial.htm

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Big Data)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	2	2	3	3	2	2	2	3	1	3	2.4
CO-5	3	3	3	2	3	3	2	2	3	3	2	2	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	2	2.4
Average	3	3	2.8	2	2.7	2.8	2	2	2.3	3	1.2	2.7	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Bio-resources and Industrial Product (*Core Course*14B1WBT 741)

(B.tech, Sem VIII) **Credits 3**

Lectures 3 Tutorial 0 Practical 0

Pre-requisites: Biochemistry, fundamental biology, chemistry

Course Objectives (Learning Goal):

The use of natural, renewable and/or bio-resources is becoming more and more important to for sustainable growth along with enormous challenges at economic, environmental level. The Objectives of the course are

1. To make the student understand the value of bio-resources
2. Introduction to bio-renewable products, processes and their related industrial sectors viz. Medicine, Food , agriculture , bio-chemicals, bio-composites, bio-energy & biofuel, and forest products.

Course Assessment:

Test 1	15
Test 2	25
Test 2	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

At the end of the course students will have a fundamental understanding of the natural bioresearches and able to

Co-PI: Define "bioproduct" to reflect the scope and focus of opportunities to understand environmentally sustainable science-based processes of conversion of living organism-based resources into manufactured goods

Co-PII:. Develop a workable concept of bio-resource utilization with respect to broad economic feasibility, considerations of bio-resource availability, conversion (technologies) and receptor industries (markets).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outline

S.N.	Topic		Lecture
1	Overview	• Resources (Renewable & Non-renewable) • Bio-resources • Bio-resources Engineering • Different Scale of Bio-resource Engineering	4
	Raw Material Resource	• Microbial Bio-resources • Plant Bio-resources • Animal Bio-Resources	6
2	Industrial Products	• Novel Plant Bioresources: • Medicine • Food • Cosmetics	12
3	Industrial Products	• Animal Bioresources: • Medicine • Food • Cosmetics	5
4	Industrial Products	• Microbial Bioresources: • Medicine • Food • Cosmetics	6
5	Processing Technology	• Biorefinery Concept • Processes for converting Raw material to biobased product • Novel Development in Procesing Technology	6
6	Case Study	• Case study of lignocellolose-Ethanol Processing	2

Methodology

The course will be taught through lectures. Apart from the discussions on the topics covered in the lectures, presentations, assignments in the form of questionnaires will also be given.

Internal Assessment

Assessment	Marks
Quiz/presentations	15
Assignment	5
Attendance	5
TOTAL	**25**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Books and references

Text Books:

- ✓ Renewable Bioresources: Scope and Modification for Non-food Applications Editors CHRISTIAN V. STEVENS
- ✓ Biotechnology for Agro-Industrial Residues Utilisation Poonam Singh nee' Nigam · Ashok Pandey
- ✓ Emerging Bioresources with Nutraceutical and Pharmaceutical Prospects: Seema Patel
  San Diego State University, San Diego, California, USA, Springer
- ✓ Dairy Chemistry and Biochemistry P.F. FOX and P.L.H. McSWEENEY Department of Food Chemistry University College, Cork Ireland

Reference Books and material

- ✓ Review articles on relevant topics from diverse sources
- ✓ *BioResources* (ISSN: 1930-2126): a peer-reviewed online journal devoted to the
- ✓ science and engineering of lignocellulosic materials, chemicals, and their applications for new uses and new capabilities

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Foundations of Block Chain

Course Code: 19B1WCI839

Course Credit: 3-0-0

Course Pre-requisites (if any): Some programming experience (at least one year suggested). Potential students will need to pass a brief programming assessment for enrollment in the course.

Course Objectives:

S No	Course Outcomes (Block Chain Technologies) 18B1WCI836	Level of Attainment
CO-1	Explain how bitcoin works, from when a transaction is created to when it is considered part of the blockchain	Familiarity
CO-2	Thoroughly explain private and public keys as well as addresses and how exactly they are constructed and used	Familiarity
CO-3	Expose students to the different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading	Assessment
CO-4	Decompose a blockchain system's fundamental components, how they fit together and examine a modular blockchain system in more detail	Assessment
CO-5	Detailed understanding of naïve Attacks and Trustless Networks of block chain	Assessment
CO-6	Provide a thorough understanding of smart contracts, their technical capabilities, practical applications, limitations and security constraints they operate within	Usage
CO-7	Explain to students both fundamental and implied differences between Ethereum and Bitcoin protocol by covering historical, conceptual and architectural distinctions	Assessment

Detailed Course Contents:

Module	Contents	Lectures required
Module-1	**The story of a transaction** a) From Transactions to Blocks b) Blocks and Distributed Consensus c) Basic interaction with a Bitcoin node	2
Module-2	**Keys and Addresses** a) Basic cryptography b) From private keys to addresses	2
Module-3	**The Bitcoin Script language** a) Introduction to the Bitcoin Script language b) Script writing and execution c) Advanced scripting	8
	d) Tools and libraries to access Bitcoin's API and scripting capabilities **Blockchain deployment** a) Mining and forking	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	b) Upgrading the network c) Related BIPs d) Segregated Witness (SegWit)	
Module-4	**Blockchain architectures** a) Abstract Architecture b) Ways to dive deeper c) Introduction to major blockchain platforms	**6**
Module-5	**Comparing Bitcoin and Ethereum** a) Historical comparison b) Conceptual distinction between a payment system and a decentralized applications platform *c)* Differences in their architectures from *security-first aspect to a rich feature set* d) Future roadmap for them, following their own paths with probable interconnections	**8**
Module-6	**Development environment** a) Multitude of clients in Ethereum b) Production and test networks in Ethereum *c) Public, private and development deployments* **Contract code walk-through** a) Demonstration of smart contract b) Introduction to Solidity c) Contract lifecycle	**8**
Module-7	**Solidity in depth** a) Building blocks b) Popular contracts already in deployment **Considerations for production deployment** a) Quality of decentralized applications b) Code patterns *c) Security* d) Other smart contract platforms e) Discussion of future prospects	**8**
	TOTAL LECTURES	**42**

Suggested Text Book(s):

- Mastering Bitcoin, Andreas Antonopoulos, O'Reilly Publishing, 2014, ISBN: 978-0691171692.
- Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto, Online 2009 https://bitcoin.org/bitcoin.pdf
- Vitalik Buterin, Ethereum White Paper, Online, 2017, https://github.com/ethereum/wiki/wiki/ White- Paper

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

- Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, A. Narayanan, J.
- Bonneau, E. Felten, A. Miller, S. Goldfeder, Princeton University Press, 2016, ISBN: 978-0691171692
- The Science of the Blockchain, Roger Wattenhofer, CreateSpace Independent Publishing Platform, 2016, ISBN: 978-1522751830
- Ethereum Programming, Alex Leverington, Packt Publishing Limited, 2017, ISBN: 978- 1786463715

Other useful resource(s):

- Bitcoin Protocol Specifications (https://en.bitcoin.it/wiki/Protocol_specification)
- Bitcoin transaction Scripting (https://en.bitcoin.it/wiki/Script)
- Majority is not Enough: Bitcoin Mining is Vulnerable (http://arxiv.org/abs/1311.0243)
- Two Bitcoins at the Price of One? Double-Spending Attacks on Fast Payments in Bitcoin (http://eprint.iacr.org/2012/248.pdf)
- Ethereum documentation (http://www.ethdocs.org/en/latest)
- Solidity documentation ((https://solidity.readthedocs.io/en/develop))
- https://sites.google.com/site/blockchaintutorial/blockchain-course-content

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes (2) - 10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	83
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	86
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	81
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	83
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	81
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	86
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	81
Weightage	86	71	86	71	81	86	86	86	71	86	95	90	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Cloud Computing

COURSE CODE: 18B1WCI737

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Operating System

Course Objectives:

1. To demonstrate an understanding of cloud computing concepts and standards.
2. To understand all enabling technologies of Cloud computing.
3. To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
4. To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To understand different enabling technologies for Cloud computing environment.	Assessment
CO-3	To design Cloud computing data-center for effective utilization of available resources	Usage
CO-4	To study different managers related to Cloud computing services	Assessment
CO-5	To understand dofferent case studies of Cloud computing and its advance topics	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Understanding Cloud Computing:** Basic Concepts and terminology, Goals and Benefits, Risks and Challenges, Roles and boundaries, Cloud characteristics, Cluster Computing, Grid Computing, NIST Architecture, Cloud Deployment models, Cloud service models.	7
2	**Cloud Enabling Technologies:** Virtualization, Types of virtualization, Server Consolidation, virtualization management, Web Technology, Service, Oriented Architecture, Datacenter and Multi-tenancy	7
3	**Cloud Infrastructure Management:** Cloud datacenter design, Workloads and software infrastructure for a datacenter, Datacenter hardware, energy and power efficiency in a datacenter., Cloud usage monitor, Monitoring agent, Resource agent, Polling Agent	7
4	**Cloud Mechanisms:** Automated Scaling, Load Balancer, SLA Monitor, Failover System, Multi-Cloud Broker	7

Approved in Academic Council held on 23.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Fundamental Cloud Architectures:** workload distribution architecture, resource pooling architecture, dynamic scalability architecture, service load balancing architecture, cloud brusting architecture. Billing Management System Business cost metrics, cloud usage cost metrics,	7
6	Cloud service metrics., Cloud Security, Mobile cloud computing, Disaster recovery in cloud computing, Case studies	7
Total lectures		**42**

Suggested Text Book(s):

1. Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568
2. Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.

Suggested Reference Book(s):

1. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
2. The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
3. Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
4. The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
2. Link to topics related to course:
   i. https://www.edx.org/learn/cloud-computing
   ii. https://www.udemy.com/introduction-to-cloud-computing/

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Cloud Computing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	2	2	1	2	2	1	2	3	**1.8**
CO-2	3	2	1	2	2	2	1	2	2	1	3	2	**1.9**
CO-3	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-4	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-5	3	3	3	3	3	1	2	1	2	2	3	2	**2.3**
Average	**2.6**	**2**	**2.2**	**2**	**2.2**	**1.4**	**2**	**1.8**	**1.6**	**1.2**	**2**	**1.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Cognitive Radio Networks

(Elective Subject)

Course Code:	14B1WEC733	Semester:	7th Sem. B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course objectives

1. To understand the spectrum scarcity problem and how cognitive radio deals with this problem.
2. The contribution of cognitive radio systems in wireless networks and its architectures that enable the development of the cognitive radio network (both centralized and distributed).
3. Technologies to allow an efficient use of TVWS for radio communications.
4. Discussion about various cognitive radio standards.
5. Understanding the various research challenges for deployment of cognitive radio network.
6. Update about current research scenario in this field

Course outcomes

Upon successful completion of this course the students will have developed following skills/abilities

1. Fundamental issues regarding dynamic spectrum access and radio-resource management.
2. Emerging issues in cognitive radio network.
3. Different spectrum sharing models.
4. Efficient sharing of the unutilized spectrum among cognitive and licensed users.
5. Interference avoidance at licensed user due to cognitive user's transmission.

Unit	Topics	Lectures
1.	**Introduction to Cognitive Radio:** Spectrum scarcity, Spectrum white space, Fixed spectrum allocation, Software defined radio (SDR), Limitations of SDR, Evolution of cognitive radio, Dynamic spectrum access, Introduction to cognitive radio concept, Cognitive cycle, Functions of cognitive radio; spectrum sensing, spectrum management, spectrum mobility, Cognitive radio architecture, Interference temperature and its models.	8
2.	**Spectrum Sensing and challenges in cognitive radio network:** Hypothesis model for spectrum sensing, Types of spectrum sensing; Non-cooperative sensing, Cooperative sensing, Interference-based sensing, Matched filter detection, Energy detection, Cyclostationary feature detection, advantages and disadvantages of various spectrum	11

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	sensing techniques, False alarm, Miss detection, Optimal sensing framework for infrastructure based cognitive radio network. Research challenges in spectrum sensing, spectrum management and spectrum mobility, potential applications of cognitive radio, IEEE 802.22 for WRANs.	
3.	**Spectrum sharing and management:** Dynamic spectrum Access (DSA): models and architectures, Opportunistic spectrum access (OSA), Antenna Systems, MIMO systems, Smart antenna and beamforming. SDR architecture, Software tunable analog radio components, Reconfigurable digital radio technologies.	8
4.	**Cross layer adaptation and security in cognitive radio:** Why we need cross-layer design, adaptation and optimization, Cognitive radio cross layer design, security challenges in cognitive radio. **OFDM for cognitive radio:** OFDM based cognitive radio, Why OFDM is a good fit for Cognitive radio, Challenges to cognitive OFDM systems, Multiband OFDM, A step toward cognitive-OFDM: standards and technologies.	9
5.	**Cognitive radio regulation and standardization:** regulatory issues and new spectrum management regimes, spectrum planning, Spectrum authorization, Standards and international activities. **UWB cognitive radio:** Introduction, Fundamentals of impulse radio Ultra Wideband, Cognitive radio requirements versus IR-UWB, Merging impulse radio with cognitive radio.	6
	Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Recommended Reading

1.	Dynamic Spectrum Access and Spectrum Management in Cognitive Radio Networks, Ekram Hossain, Dusit Niyato, and Zhu Han, Cambridge University Press, 2009.
2.	Cognitive Radio Networks, Yang Xiao and Fei Hu, CRC Press.
3.	Cognitive Radio Technology, Bruce Fette, Elsevier, 2006.
4.	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Huseyin Arslan, Springer, 2007.
5.	Essentials of Cognitive Radio, Linda E. Doyle, Cambridge University Press, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Molecular Evolution

15B1WBI834 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology, evolutionary biology, functional genomics and various kind of graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop functional and evolutionary genomic understanding of biological entities for various kind of lineages for biological data types such as DNA, RNA, Genes, Proteins etc.

Course Assessment:

T-1 test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis

CO II: Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information

CO III: Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data

Topics covered:

Introduction to molecular evolution and its role in the regulation of various biological processes.

Introduction to evolutionary biology, functional genomics, basics of data types for biological

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

sequences their importance and applications in further analysis. Genes, operons, regulons, stimulons, genomes, proteins, proteomes etc. Patterns of base composition and codon usage, gene duplication, pseudogenes, orphan genes, gene gain and gene loss processes, overlapping and nested genes, exonization, intron and RNA editing, functional convergence, hypothetical proteins and their annotations. Various kind of mutations and selection pressure and related theories. Description of models, methods and algorithms that are most useful for analysing the ever-increasing supply of molecular sequence data, with a view to furthering our understanding of the evolution of genes, proteins, and genomes. Models of nucleotide substitution, models of amino acid and codon substitution, phylogeny reconstruction: Overview, Maximum Likelihood methods, Bayesian methods, comparison of methods and tests on trees, molecular clock and estimation of species divergence times, neutral and adaptive protein evolution, simulating molecular evolution.

Text and Reference books

1. Molecular Evolution
   by Dan Graur and Wen-Hsiung Li, Sinauer Associated Inc. Pub., USA
2. Computational Molecular Evolution
   by Ziheng Yang, Oxford Series in Ecology and Evolution
3. Molecular Evolution: A phylogenetic approach
   Rodric DM Page and Edward C Holmes, Blackwell Science Ltd.
4. Inferring Phylogenies
   J. Felsenstein, . Sinauer Associated Inc. Pub., USA
5. Molecular Evolution and Phylogenetics
   Masatoshi Nei and Sudhir Kumar, Oxford University Press
6. Bioinformatics and Molecular Evolution
   by Paul G Higgs, Blackwell Publishing

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis	H	H	H	L	H	H	M	86
CO-II	Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information	H	H	H	M	H	H	M	90
CO-III	Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data	H	H	H	M	H	H	H	95
	Assessment (%)	**100**	**100**	**100**	**56**	**100**	**100**	**78**	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CONTEMPORARY INDIA IN GLOBALIZED ERA: CHALLENGES OF DEMOCRACY AND DEVELOPMENT

COURSE CODE:18B1WHS831

COURSE CREDITS: 3

AUDIT:

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.
2. The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.
3. The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.
4. The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.	Familiarity
CO-2	The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.	Familiarity
CO-3	The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.	Familiarity
CO-4	The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Contextualising Modern India:** Overarching visions of India's national movement: domestic and international, Challenges of nation-building within its domestic contours, Continuities and shifts in Indian polity and society, Rising aspirations and constraints in post Globalized era, Digitising India: Prospects and Challenges	10
2	**India in World Affairs:**Gandhi-Nehru Legacy and policy of nonalignment: Formative Years, Post-Cold war challenges and changing global configurations, India's growing role in world affairs: soft power capacity, diaspora, major bilateral, regional and global concerns and aspirations, India and Major Powers, India and its neighbours, India and Brics	15
3	**India's security concerns:** External Threats: China and Pakistan,Internal Threats: Kashmir and Northeast, Spectre of Terrorism	9
4	**Non-traditional Security:** Human Security Concerns, Energy Security, Water and Food Security, Health and Safety	6
5	**Challenges ahead** India has had a phenomenal rise in terms of economic growth, technical knowhow, and has performed well on various other parameters. Nonetheless there are severe constraints to its unfolding. This topic will cover some of the challenges that India is facing today and the measures it is taking to overcome them.	2
Total lectures		**42**

Suggested Text Book(s):

1. Tharoor, Shashi. 'India: From Midnight to the Millennium'
2. Wajid Ali, H.M. 'India and the Non-aligned Movement'
3. Budhania, Rajpal. 'India's National Security Dilemma'
4. Asthana, Vandana. Shukla, A.C. 'Water Security in India'

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Suggested Reference Book(s):

1. Candra Bipin, 'Freedom Struggle'
2. Ram Chandra Guha, 'India after Gandhi'
3. Tharoor, Shashi. 'India: From Midnight to the Millennium'
4. Chandra, Bipan. 'India since Independence'
5. Sen, Amartya. 'Development as Freedom'
6. Ninan Thomas,Pradeep. 'Digital India: Understanding Information, Communication and Social Change'
7. Menon, Shivshankar. 'Choices: Inside the Making of Indian Foreign Policy'
8. Wajid Ali, H.M. 'India and the Non-aligned Movement'
9. Mandrup, Thomas. 'The BRICS and Coexistance'
10. Sikri, Rajiv. 'Challenge and Strategies: Rethinking India's Foreign Policy'
11. P. Bajpai, Kanti. Pant, Harsh.V. 'India's National Security'.
12. Budhania, Rajpal. 'India's National Security Dilemma'
13. Sondhi. M.L. 'Nuclear Weapons and India's National Security'
14. Centre for Strategic Studies - 'Energy Security Challenges: Non Traditional Security Planning in India'
15. Asthana, Vandana. Shukla, A.C. 'Water Security in India'
16. Kolas, Ashild and Miklian, Jason. 'India's Human Security: Lost Debates, Forgotten
17. People, Intractable Challenges'.
18. Venkateshwar, Sita. 'Globalisation and the Challenges of Development in Contemporary India'

Other useful resource(s):

1. **https://www.goodreads.com/book/show/356824.India_After_Gandhi**
   https://www.springer.com/in/book/9789811004537
2. **https://www.academia.edu/35220477/Non-**

   Aligned_Movement_A_Historic_Movement_reinventing_itself

   _for_Future_NonAligned_Movement_A_Historic_Movement_

   reinvening_itself_for_Future

3. **https://www.routledge.com/Indias-Human-Security-Lost-**

   Debates-Forgotten-People-Intractable-Challenges/Miklian

   Kolas/p/book/9780415830683

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Report writing (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Contemporary India in Globalized era: Challenges of Democracy and development)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	2	2	3	3	3	3	3	0	3	2
CO-2	0	3	0	2	2	3	3	3	2	3	0	3	2
CO-3	0	2	0	2	3	3	3	3	2	3	0	3	2
CO-4	0	0	0	2	2	3	3	3	2	3	0	3	1.75
Average	0	1.25	0.75	2	2.25	3	3	3	2.25	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Introduction to Deep Learning

COURSE CODE: XXX **COURSE CREDITS:** 3 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 3-0-0

Pre-requisite:

1) Basic knowledge of Python.
2) Basic linear algebra and probability.

Course Objectives:

1. The goal of this course is to give learners a basic understanding of modern neural networks and their applications in computer vision and natural language understanding.
2. The course starts with a recap of linear models and discussion of stochastic optimization methods that are crucial for training deep neural networks.
3. Learners will study all popular building blocks of neural networks including fully connected layers, convolutional and recurrent layers.
4. Learners will use these building blocks to define complex modern architectures in TensorFlow and Keras frameworks.
5. In the course, project learner will implement a deep neural network for the task of image captioning which solves the problem of giving a text description for an input image.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Linear regression: mean squared error, analytical solution.	Familiarity
CO-2	Logistic regression: model, cross-entropy loss, class probability estimation	Assessment
CO-3	Gradient descent for linear models. Derivatives of MSE and cross-entropy loss functions.	Assessment
CO-4	The problem of overfitting.	Usage
CO-5	Regularization for linear models.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction to optimization:** Linear regression, Linear classification Gradient descent, Overfitting problem and model validation, Model regularization, Stochastic gradient descent, Gradient descent extensions9m	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Introduction to neural networks:** Multilayer perceptron (MLP), Chain rule, Backpropagation, Efficient MLP implementation, Other matrix derivatives, what is TensorFlow, our first model in TensorFlow, What Deep Learning is and is not, Deep learning as a language	8
3	**Deep Learning for images:** Motivation for convolutional layers1 1m Our first CNN architecture, Training tips and tricks for deep CNNs, Overview of modern CNN architectures, Learning new tasks with pre-trained CNNs, A glimpse of other Computer Vision tasks8m	6
4	**Unsupervised representation learning:** Unsupervised learning: what it is and why bother, Autoencoders 10, Autoencoder applications, Autoencoder applications: image generation, data visualization & more, Natural language processing primer, Word embeddings, Generative models 10, Generative Adversarial Networks, Applications of adversarial approach	6
5	**Deep learning for sequences:** Motivation for recurrent layers, Simple RNN and Backpropagation, The training of RNNs is not that easy, Dealing with vanishing and exploding gradients, Modern RNNs: LSTM and GRU, Practical use cases for RNNs	8
6	**Final Project:** This week you will apply all your knowledge about neural networks for images and texts for the final project. You will solve the task of generating descriptions for real-world images!	6
	Total Lecture Hours	42

Suggested Text Book(s):

Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", The MIT Press, Cambridge, 2016.

- Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer, 2018.

Suggested Reference Book(s):

- Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media
- Andrew Ng, "Machine Learning Yearning", available online published by deeplearning.ai

Other useful resources (s):

- http://www.charuaggarwal.net/neural.htm
- https://www.coursera.org/specializations/deep-learning

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Evaluation Scheme:

S No	Exam	Marks	Duration	verage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Introduction to Deep Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.6	2.6	2.6	2.4	1	1	1	2	2.4	1.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Deep Learning

Course Code: 18M1WCI332

Course Credits: 3 (3-0-0)

Pre-requisite Course: Machine Learning.

Pre-requiste:

- Knowledge of basic Machine Learning Techniques.
- Familiarity with the probability theory.
- Familiarity with linear algebra.

Description & Rationale:

Deep learning (also known as deep structured learning or hierarchical learning) is part of a broader family of machine learning methods based on learning data representations, as opposed to task-specific algorithms. Learning can be supervised, semi-supervised or unsupervised. Deep Learning is one of the most highly sought after skills in AI. In this course, you will learn the foundations of Deep Learning, understand how to build neural networks, and learn how to lead successful machine learning projects. You will learn about Convolutional networks, RNNs, LSTM, Adam, Dropout, BatchNorm, Xavier/He initialization, and more.

Objectives:

- Understand the major technology trends driving Deep Learning.
- Be able to build, train and apply fully connected deep neural networks.
- Know how to implement efficient (vectorized) neural networks.
- Understand the key parameters in a neural network's architecture.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes:

S.No.	Course outcomes (Deep Learning) (18B1WCI831)	Level of Attainment
CO-1	Understanding the foundations of neural networks and deep learning.	Familiarity
CO-2	Techniques to improve neural networks: regularization and optimizations, hyperparameter tuning.	Assessment
CO-3	Convolutional Neural Networks and its applications (object classification, object detection)	Assessment/Usage
CO-4	Recurrent Neural Networks, its applications(natural language processing, speech recognition)	Assessment/Usage
CO-5	Advanced topics: Generative Adversarial Networks, Deep Reinforcement Learning, Adversarial Attacks	Usage

Course Contents / Lecture Plan:

S.No.	Topics	Hrs.
1	Introduction to deep neural network and its difference with simple neural networks.	1
2	Structure of deep neural networks and its applications in different domains	1
3	Cost Function and Gradient Descent in deep neural network	2
4	Forward Pass and backward pass computation in deep neural network.	3
5	Activation Function, Types of activation function and their usages.	1
6	Bias and Variance in deep neural network and Bias and Variance tradeoff.	3
7	Techniques to remove high variance and high bias: Regularization, Dropout technique, Early Stopping, Data Augmentation, Normalization of training test	3
8	Vanish and exploding gradient in deep neural network	1
9	Optimization Algorithms: batch, mini batch, exponential weighted average, RMS prop, Adam optimization algorithm	4
10	Learning rate decay and Multiclass classification- Soft Max layer	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

11	Introduction to Convolution neural network.	2
12	Types of CNNs: Convolution, pooling, fully connected.	3
13	Case Studies of CNN: LeNet-5, AlexNet, VGG-16, ResNets, Inception Network	4
14	Recurrent Neural Network(RNNs): Introduction, comparison with standard neural network, forward and backward propagation in RNNs.	2
15	Bidirectional RNNs, Deep Recurrent Networks, issues with RNNs	3
16	Long Short Term Memory and other gated RNNs	3
17	Applications of DNNs: Large scale data analysis, computer vision, speech recognition, natural language processing and other applications	3
	Total	**42**

Tools and Technologies:

Python 3.7, Anaconda Framework, Jupyter Notebook.

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered uptoT-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) -10 Quizzes (2) - 10 Attendance -5

Text Book:

T1: Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", The MIT Press, Cambridge, 2016.
T2: Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer, 2018.

References:

R1: Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media
R2: Andrew Ng, "Machine Learning Yearning", available online published by deeplearning.ai

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Online Material:

O1: http://www.charuaggarwal.net/neural.htm

O2: https://www.coursera.org/specializations/deep-learning

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

S. No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Total
CO-1	H	L	L	L	M	M	L	M	M	L	M	H	55%
CO-2	H	M	L	M	M	M	L	M	M	L	H	M	58%
CO-3	M	M	H	M	M	L	H	M	L	L	L	L	55%
CO-4	M	M	H	M	M	L	H	M	L	L	L	L	55%
CO-5	H	H	H	H	H	L	M	L	M	M	H	M	66%
Average Score	72%	60%	64%	60%	64%	48%	60%	56%	52%	44%	56%	56%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology, Waknaghat

Design and Analysis of Real World Algorithms

Course Code: 17B1WCI814

Course Credits: 3 (3-0-0)

Description & Rationale:

This course covers how algorithms and theory are used in "real-world" applications. The course will cover both the theory behind the algorithms and case studies of how the theory is applied.

Objectives:

- Interesting algorithms arise in many real world applications in a broad variety of areas. Getting a better understanding of where and how these algorithms are used can be valuable in many ways. It can help in the teaching of algorithms by supplying up-to-date examples of the contexts in which algorithms are used. It can help make effective use of algorithms in industry by allowing better sharing of experiences. It can help motivate new problems to consider, or can improve our understanding of the models and the assumptions we make in various problem domains. It can give us a better feeling of what it takes to have industry use algorithms, and it can help us better understand what factors are important in the design of algorithms.

- Develop ability to design and analyze real world algorithms.
- Apply real world algorithms to various examples and real life applications

Course Outcomes:

S.NO	Course outcomes (Design and Analysis of Real World Algorithms) (17B1WCI814)	Level of Attainment
CO-1	To acquire knowledge of Machine learning algorithms	Familiarity
CO-2	To gain knowledge on the notions Cryptographic algorithms	Assessment
CO-3	To have hands on Network Algorithms and their applications in problem solving.	Assessment
CO-4	To have hands on skills to evaluate Compression algorithms and their applications and implementations in day to day problem solving.	Assessment
CO-5	To evaluate different kinds of Geometry and graphics algorithms and their applications and implementations in simulations.	Assessment
CO-6	To gain understanding of Algorithms for Big Data : representation and algorithms	Usage

Learning Outcome:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Students will learn:

- What is the process of getting algorithms used in real world?
- How important are constants and how important are asymptotics in practice?
- Are there application domains in which algorithms should be playing a larger part?
- How do we deal with the tension between (a) creating broadly useful algorithms for generic problems, and (b) meeting the needs of a specific client?
- The real world is noisy. How should algorithms deal with noisy input data?

Pre-requisite Course: Introduction to Algorithms

Maintenance of Records:

Students are expected to keep records of homework assignments (to be posted on student's resource from time to time) neatly in suitable hard bound notebooks separately (one for each). The same will be submitted on or before the scheduled time.

Course Contents:

Topics	HRS
1. **Compression algorithms**: Information Theory, Huffman/Arithmetic/Gamma Codes, Context Coding/PPM, Lempel Ziv/Gzip/Burrows Wheeler, Graph Compression	5
2. **Linear programming & game development**: Flow problems as Linear programs Simplex, Elipsoid and Interior point methods, Airline crew scheduling, Sudoku, Chess, Candy crush	6
3. **Cryptographic algorithms**: One-way functions, basic protocols, Number theory review: groups, fields, Galois fields, Private key cryptosystems (Block Ciphers, Rijdael), Public key cryptosystems (SSL, RSA, ElGamal, Diffie-Hellman), Kerberos and Digital Cash)	5
4. **Network Algorithms:** Packet forwarding, switch scheduling, traffic shaping, bandwidth partitioning, buffer management and congestion control	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5. **Machine learning algorithms:** Decision Trees, Naive Bayes , Ordinary Least Squares Regression, Logistic Regression, Support Vector Machines	6
6. **Algorithms for Big Data:** MapReduce, Approximate Counting, Count-min Sketch, Random Walks, PageRank	4
7. **Geometry and graphics:** Convexity, triangulation, sweeping, spatial partitioning, Voronoi Diagram, Robot Motion Planning	5
8. **Spectral Algorithms,** Low rank Approximations, Random projections, Graph sparsification, Community detection	5
Total	**42**

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. A project problem is to be taken up and implemented as a continous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Evaluation Components:

Evaluation scheme is designed to promote and test higher level thinking skills through holistic and continuous evaluation and de-emphasis rote learning. Written exams will be designed and conducted as close/open book(s), close/open notes tests. One of the minor tests will be designed and conducted as a take home test and will be based on individual's research and literature survey. Evaluation scheme will have the following components:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	Test-1	15	1 hour.	Syllabus covered upto Test-1
2	Test -2	25	1.5 hours	Syllabus covered upto Test-2
3	Test -3	35	2 hours	Syllabus covered upto Test-3
4.	Tutorials / Assignments,	25	Entire	Assignment (5) - 9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Quizzes, Attendance		Semester	Quizzes (5) -12 Attendance - 4

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	H	H	H	M	M	H	M	M	M	H	L	H	81%
CO-2	H	H	H	M	H	M	H	M	M	H	L	H	77%
CO-3	H	H	H	M	M	H	L	M	H	H	L	H	85%
CO-4	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-5	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-6	H	H	H	M	H	H	M	M	M	H	L	H	85%
Weightage	100%	100%	100%	70%	70%	80%	60%	90%	83 %	84%	70%	100%	100%

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Text Book(s):

1. Algorithms:- S. Dasgupta, C. Papadimitrou, U. Vazirani
2. Network Algorithms:- Robert Tarzan
3. Computational Geometry: Algorithms and Applications:- Mark de Berg
4. Randomized Algorithm: Raghavan

Course Material:

Lecture presentations and assignments will be posted on the student resource from time to time. In addition following additional online/downloadable resources will be useful.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Environmental Biotechnology

COURSE CODE: XXXXXXX

COURSE CREDITS: 3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Environmental pollution: Cause and remediation strategies

Course Objectives:

Environmental Biotechnology is a rapidly developing, increasingly important branch of science that has implications for both the prevention and cleans up of pollution in domestic and industrial waste streams. The environmental applications of biotechnology will be presented in detail and will be supported by examples from the national and international literature. Such environmental applications of biotechnology include: Bioremediation of pollutants, applications in agriculture, applications in sustainable development in various industries well as in detection and monitoring environmental deterioration.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO I	Students will become aware of concept and scope of environmental biotechnology.	Familiarity
CO II	Students will have knowledge different techniques of bioremediation of pollutants	Assessment
CO III	Students will acquire knowledge about application of biotechnological methods in agriculture to reduce environmental impact.	Assessment
CO IV	Student will have acquaintance use of bioresources and biotechnology in various industries for sustainable development	Usage
CO V	Students will have knowledge about biotechnological methods for detection and monitoring of environmental deterioration	Usage
CO VI	Can analyse case-studies representative of key areas of environmental biotechnology	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Environmental Biotechnology**	Concept, Scope, areas and examples on subject matter	2
2	**Bioremediation**	Fundamentals, Methods and strategies In situ and Ex situ bioremediation, (Bio)venting, (Bio)sparging, (Bio)stripping, (Bio)sorption barriers, Biofilters, Bioreactors, Case studies , Phytoremediation: Technical considerations, Types factors case studies	8
3	**Hazardous Waste Management**	Energy Resource Recovery from Hazardous Waste Medical waste, Electronic waste. Characterization of the Harmful Effects of Chemicals and Materials, and Fate of HM in Environment risk Assessment.	8
3	**Environmental Protection Biological waste Treatment**	: Thermochemical conversion of biomass: combustion, pyrolysis, gasification, catalysis. Composting, Vermocomposting, Incineration Landfill Recycling Windrow composting. Liquid waste treatment; Biofilters, activated sludge systems.	4
4	**Environmental Biotechnology and Agriculture:**	Bio fertilizers: Symbiotic systems between plants – microorganisms, Chemical pesticide, Biopesticides, Biological control of pests Plant growth promoting rhizobacteria (PGPR) – uses, practical aspects and problems in application Soil Enzymes – origin and range of enzymes in soil, methods of measurement and extraction of soil enzymes, interactions between agrochemical and soil enzymes.	8
5	**Renewable energy and bio-based products**	Bioconversion of biomass to fuels, liquid and gaseous biofuels production, modelling and economics, Polutry waste biomass, Bio adhesives, Biopolymers, Bio lubricants, Bio plastics, fibers and paper.	8
6	**Detection of Pollutants and Environmental Monitoring:**	Bio-Indicators or Biomarkers, Biosensors for Environmental Monitoring. Toxicity screening of samples using bioluminescence or fluorescence, Water quality monitoring, Atmospheric quality bio-monitoring, and. Soil-contamination bio-monitoring.	4
		Total Number of Lectures	**42**

TEXT BOOKS

1 Environmental Biotechnolgy MH. Fulekar

2 Environmental Biotechnology (By: Arvind Kumar)

3 Textbook of Environmental Biotechnology P.K. Mahapatra

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4. Introduction To Environmental Biotechnology 3rd Edition (English, Paperback, A. K. Chatterji)

REFERENCE BOOKS

1 Environmental Biotechnology: Theory and Application Gareth M. Evans (Author), Judith C. Furlong (Author)

2 Environmental Biotechnology" by Bhattacharya B C and Banerjee R

Other useful resource(s):

https://nptel.ac.in/course.php?disciplineId=102

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	1	2	2	2	1	2	1	2	
CO-2	1	2	2	1	2	1	1	2	2	2	1	3	
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	
CO-4	3	2	2	3	2	1	1	1	2	2	-	2	
CO-5	3	1	2	1	2	1	2	1	2	1	2	1	
CO-6	2	2	1	1	2	1		1	2	-	2	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Next Generation Communication Systems

COURSE CODE: 18B1WEC745

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of wireless communication and probability theory

Course Objectives:

1. To analyze the channel parameters effects on communication system.
2. Understanding of advanced techniques employed for improvement of communication system.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basics of communication system and various standards used in different generation.	Familiarity
CO-2	Understand the modeling of channel used in communication.	Familiarity
CO-3	Analyze the effect of various parameters on the performance of communication system.	Assessment
CO-4	Demonstrate the various techniques for performance improvement of communication system	Assessment
CO-5	Apply advanced techniques to next generation communication system	Usage

Course Contents:

Unit	Contents	Lectures required
1	CDMA: Introduction to various generation of cellular communication systems and standards, Introduction to CDMA and Spread Spectrum, Generation and Properties of PN Sequences, correlation between PN Sequences, Walsh Code, Variable tree OVSF, LFSR, Rake Receiver, Near-Far effect, Multi user CDMA uplink and downlink.	9
2	Channel Characterization of Next generation communication system: BER and SNR analysis of wired and wireless channels, Effect of various channel parameters on performance of wireless communication system, Doppler shift.	6
3	Diversity & Equalization: Diversity System Model, Receiver Diversity: selection diversity, feedback diversity, maximal ratio combining, equal gain combining, Equalizers, Types of Equalizers: linear equalizers, non-linear equalizers.	9
4	Principles of OFDM and MIMO wireless communication: Introduction to OFDM, OFDM Block Diagram, MIMO Wireless Communication, Benefits of MIMO Technology, MIMO OFDM Building Block, Capacity Comparisons of SISO, SIMO, MISO, and MIMO.	9
5	Singular Value Decomposition, Software Defined Radio , Cognitive Radio	9
Total lectures		42

Suggested Text Book(s):

1. T.S. Rappaport, "Wireless Communication", 2nd Edition, Prentice Hall.,2002.
2. A.Goldsmith, " Wireless communication" 1st Edition , Cambridge University Press,2005.
3. Ye Li and Gordon L. Stuber, "Orthogonal Frequency Division Multiplexing for Wireless Communications" 1st Edition, Springer, 2006.

Suggested Reference Book(s):

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Huseyin Arslan: Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, 1st Edition, Springer, 2007.

2. Hui Liu, "OFDM based broadband wireless networks: design and optimization", 1st Edition, John Wiley & Sons, 2006.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/117104099/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Next Generation Communication Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	1	2	2	2	1	2	2	2	1.92
CO-2	3	3	3	3	2	2	1	1	1	2	2	2	2.08
CO-3	3	3	3	3	2	1	1	1	1	2	1	1	1.83
CO-4	2	3	3	2	2	1	1	1	1	2	1	3	1.83
CO-5	3	2	2	2	3	2	2	1	1	2	2	2	2.00
Average	2.6	2.8	2.6	2.4	2	1.6	1.4	1.2	1	2	1.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

10B14BT843 **GENETIC COUNSELLING** **(Elective *Course*)**

Credits 3

Lectures 3 Tutorials 0 Practical 0

Pre-requisites: Molecular Biology/Genetics

Objective:

The objectives are to study the basis of genetic counselling, diagnostic testing and management for a variety of types of disorders, ethical and legal considerations and risk assessment.

Course Assessment:

Test 1	15
Test 2	25
Test 3	35
Teacher Assessment (Based on Assignments, quizzes, presentation etc.)	25
Total	100

Course Outcomes:

The students will understand the nature of the directive and non-directive counselling process and the need to educate the patient and family to make informed decisions relating to complex genetic situations.

Topics Covered:

Genetic Counseling: Counselling, prenatal counseling, diagnostic testing and management of genetic disorders; risk assessment, genetic counseling and ethical issues.

Genetic disorders, counseling and their management: Human chromosomal disorders; Human allelic diseases (monogenic and oligogenic): cystic fibrosis, glucose-6-phospho dehydrogenase deficiency, Bradet-Biedl syndrome and some important autosomal recessive and dominant disorders; Muscle disorders: Duchenne muscular dystrophy and cardiac muscle disorder; Neurological disorder: Alzheimer, Hutington and Schizophrenia; Genetic basis of neoplastic disorders: retinoblastoma, Wilms tumor, colectral cancer, and Blooms syndrome; Gene therapy: principles of gene therapy and gene therapy for inherited disorders

Reference books

1. Strachan T and Read AP (1999) Human Molecular Genetics. Wiley-Liss, New York. 2nd Ed.
2. Pasternak JJ (2005) An introduction to Human Molecular Genetics: mechanism of inherited diseases. Wiley-Liss, New York, 2nd Ed.
3. Evans C (2006) Genetic Counselling A psychological approach. Cambridge University Press, Cambridge. 1st Ed.
4. LeRoy BS, Veach PM, Bartels DM (Eds) (2007) Genetic Counseling practice: advanced concepts and skills. Wiley-Blackwell.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

HIGHWAY CONSTRUCTION, MAINTAINANCE AND MANAGEMENT

COURSE CODE: 11B1WCE834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-2

Pre-requisite: None

Course Objectives:

1. To enhance / develop the skills of professionals working in construction and allied sectors to upgrade their skills in Construction Contracts Management and help them to grow in their career.
2. To perform different method of construction for rigid and flexible pavements based on traffic and environmental factors
3. To understand the different method of pavement repairing and maintenance
4. To develop basic understanding of the principles of pavement management

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will come to know about the types, working and importance of pavement in different condition (i.e. level or hilly terrain).	Familiarity
CO-2	Through discussion of the topic of highway construction, the students gain an appreciation for the methods and different steps involved in pavement construction.	Assessment
CO-3	Students will analyze different factors which affect the performance of pavement (i.e. environmental or traffic factor) from real-life projects and theoretical examples.	Assessment
CO-4	Students will become familier with the different methods of pavement maintenance.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Highway construction:** Introduction, history of road construction, equipments for the road construction, stages of construction, limitations in pavement construction due to weather. Earthwork: Clearing and grubbing, excavation, embankment construction, replacement of soils, soil stabilization and their types.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Flexible and Rigid pavement construction:** Flexible Pavement: different layers system and their specifications, defects in flexible pavement and their remedies, different types of pavements (i.e. dense bitumen macadam, water bound macadam etc.) and their specifications, different tests for bitumen. Rigid pavement: layer system and specifications, concrete surfacing, provision of different type of joints in rigid pavement, current practices for rigid pavement construction.	8
3	**Highway maintenance:** General, distress in pavements (Cracking, patching, rutting, pot holes, stripping and swelling), evaluation of pavement, structural evaluation, pavement maintenance.	6
4	**Introduction to transport economics:** Recycling of pavements: Introduction, selection of road for recycling, methods and equipments for recycling.	6
5	**Hill Roads:** Alignment, geometrics, design and construction for hill roads, drainage design, maintenance problems in hill roads, slope stability in hill roads, different factors responsible for pavement failure.	8
Total lectures		42

Suggested Text Book(s):

1 Hass, R., Hudson, W.R. and Zaniewski, J. "Modern Pavement Management" Krieger, 1994.

2 Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press, Taylor & Francies Group, 2006.

3 Shain, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Kluwer Academic Publishers Group, 2004.

4 Khanna, S.K. and Justo, C.E.G., "Highway Engineering" Nem Chand & Bros, Roorkee (U.A.) 8th Ed, 2005.

5 Hudson, W.R., Haas, R. and Uddin, W., "Infrastructure Management", McGraw Hill, 1997.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	2	1	2	2	3	3	2	
CO-2	3	3	3	2	3	3	1	3	2	3	2	2	
CO-3	2	2	2	2	3	2	1	2	2	2	2	2	
CO-4	3	3	3	3	2	2	1	2	2	2	3	2	
Average													

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Industrial Sociology

COURSE CODE: 18B1WHS639

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn sociology of industry, labour, human relations and management.
2. Learn how the work is being organized in an industrial organization
3. Learn how labour is abstracted in the industrial work process.
4. Learn how the issues between labour and management are constructed and how labor welfare measures are implemented.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Appreciation for Industrial society and its place within human society	Familiarity
CO-2	Have a view on the Industrialization in India and its growth	Familiarity
CO-3	Understanding about the structure of industry, Industrial Relations, the role of Trade Unions, Employee Discipline and grievance handling	Assessment
CO-4	Handling Industrial Disputes and what are their causes	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Industrial Sociology, Sociology and social Sciences :** what is Industrial Sociology? Debunking in Industrial sociology, key Industrial Concepts, Role of Diversity in Industrial sociology, Scope and Importance, development of Industrial Sociology	4
2	**Theories and Movements** : Functionalism, Durkheim, Contingency theory, conflict theory, Weber, Theory of " Modernity" and " Modernization", Critical theory, Postmodernism and Post -Structuralism	3
3	**Forerunners of Industrial System**: Early Industry of transformative Industries , factory system and its Foreman, Factories	2
4	**Growth of Industrialization**: The Industrial Revolution, Its origin and Impact,Industrial Revolution in US and Europe and around the World. Social Impact of IR	3
5	**Industrialization in India**: Indian Industry in the past, Ancient, (up to 750AD) Medieval (750 to 1757)and Modern Period , Industrialization in 18th and 19th C and during the beginning of 20th C , Indira Gandhi's Era, industrial Policy measures of the Eighties, Gandhian way of Industrialization	4
6	**Industrial Organization:** Meaning, types and Concept, Japanese Corporate Model, Emerging organizational designs, Mergers and Acquisitions	2
7	**Social Groups in Industry :** Patterned social Behaviour, Groups: Functions, Development and key Dimensions, Teams , social loafing, Group Think Conformity	3
8	**Organization and Its External Environment:** The Bhopal Plant and Union carbide, CSR, CRP, social audit, Society: Operating in Pluralistic Society	2
9	**Ethics and Human Values :** changes in Society and their Impact on Human values, Ethics and Values, Applying Ethics in Industry, policy Demands, Organizational values, Corruption	2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Module 4: Industrial Society, Industrial relations and Grievance Handling Procedures	
10	**Industrial Society:** definition, Consequences of Industrialization, Social Mobility, Migration, social differentiation and social stratification, child labour, Change in Institution of family, Impact of Technology	**5**
11	**Industrial Relations : Growth and Development:** Birth of Industrial Relations, Definition, scope, objectives and Concept, Labour Movemwent, Impact of trade Union Movement, trade Union In India, Role of Government in Industrial relations, International factors, Industrial Disputes, Strikes, Lockouts,Picketing,Gherao, Prohibiliton of Strikes and lockouts, Union Legislation, Union free Companies	**6**
12	**Employee Discipline and Grievance Handling procedures:** Nature and Purpose of Discipline, Principles of Discipline, Approaches to Discipline, Grievances in Industry, Procedures and handling	**4**
13	**Organizational Changes and Post –Industrial society:** Post Industrial society, Globalization, Impact on India of globalization War and Terrorism, Regionalization,	**2**
Total lectures		**42**

Suggested Text Book(s):

1. Narendar Singh: Industrial Sociology , Tata McGraw Hill Education Private Limited ,New Delhi
2. Vikas kaushik, Anuranjan Misra, Manju Misra: Industrial Sociology AB Publications, New Delhi

Suggested Reference Book(s):

1. Mathus A.S. : Labour policy and Industrial Relations In India
2. Mecheal V.P. : Industrial Relations and Workers Management in India
3. Butler A.D. : labour Economics and Institutions.

Other useful resource(s):

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Industrial Sociology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	1	0	0	3	3	1	1	3	0	3	1.25
CO-2	0	0	1	0	0	3	3	2	2	1	0	3	1.25
CO-3	0	3	3	3	3	3	3	3	3	3	0	3	2.5
CO-4	0	3	3	3	3	3	3	2	3	3	0	3	2.4
Average	0	1.5	2	1.5	1.5	3	3	2	2.25	2.5	0	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Title : Infectious diseases
Course code : **15B1WBT839**
Credits : **3 (3-0-0)**
Pre-requisites: **Microbiology, Immunology**

Objectives

This course is designed to give students an introduction to the field of infectious disease and their impact on socio-economic growth of a country. The course is also taught from a public health perspective and will provide students with an overview of the complete etiology, principles and practices of infectious agents.

.

Intended Learning outcome

1) Defining the basic concepts related to infectious diseases, immunology and epidemiology.
2) Understanding the basic form, function, behavior, and diversity of infectious agents and their interaction with the host
3) Analysing the underlying principles of mode of action and resistance towards the agents used to treat infectious diseases

Course Assessment and Evaluation Scheme:

Exam	% of Marks	Duration	Coverage/scope
Test 1	15	1 h	Syllabus covered up to T-1
Test 2	25	1.5 h	Syllabus covered up to T-2
Make-up Test	25	1.5 h	Syllabus covered up to T-2
Test 3	35	2 h	Entire Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Entire Semester	Entire Semester
Total	100		

Modules	**Topics**	**No. of lectures**	
1	**Introduction to infectious diseases:** Infectious and non-infectious diseases. Epidemiology of infectious diseases. Infectious agents, socio economic impact of infectious diseases	6	CO-1
2	**Infection, immunity and vaccines:** Immune system, cells and organs of immune system, non-specific and specific immunity,	8	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Host response to infections (bacterial, mycobacterial, viral, helminth, fungal), Vaccines and their impact on infectious diseases		
3	**Biology of infectious agents:** Morphology, classification, life cycle, pathogenecity, mechanism of replication in bacteria, viruses, protozoa and fungal pathogens	4	
4	**Pathology of emerging infectious diseases:** Pathogenesis, Clinical pathology, Gross pathology, Microscopic pathology, various diagnostic techniques for infectious diseases (Immunohistologic, Molecular biologic, In situ hybridization, Polymerase chain reaction).	8	CO-II
5	**Biology of major Infectious diseases:** HIV/AIDS, Tuberculosis, malaria, dengue, West Nile virus, chikungunya virus, diarrheal diseases, sexually transmitted infections, influenza, viral hepatitis, Ebola	8	
6	**Antimicrobials against infectious agents:** Antimicrobial agents, mechanism of action, Antibiotic resistance, various mechanisms of antibiotic resistance	5	CO-III
7	**Impact of emergence of New infectious diseases:** Social change and emergence of SARS, Zika virus, Ebola	3	CO-III

Recommended Books:

Evolution of infectious disease. Ewald PW. Oxford University Press, New York.1994. ISBN 0-19-511139-7.

Emerging Infections 1. Scheld WM, Armstrong D and Hughes JM, Editors. ASM Press, Washinton, DC. 1998. ISBN 1-55581-123-3

Emerging Infections 2. Scheld WM, Craig WA and Hughes JM, Editors. ASM Press, Washington, DC. 1998. ISBN 1-55581-141-8.

Emerging Viruses. Morse SS, Editor. Oxford University Press, New York. 1993. ISBN 0-19-510-484-6.

Modern Infectious Disease Epidemiology: Concepts, Methods, Mathematical Models, and Public Health (Statistics for Biology and Health) Kramer; 2010

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Defining the basic concepts related to infectious diseases, immunology and epidemiology	H	H	H	H	H	H	H	100
CO-II	Understanding the basic form, function, behavior, and diversity of infectious agents and their interaction with the host	H	H	H	M	M	M	M	81
CO-III	Analysing the underlying principles of mode of action and resistance towards the agents used to treat infectious diseases	H	H	H	H	H	H	M	95
	Assessment (%)	100	100	100	90	90	90	80	

1. Low
2. Medium
3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

11B1WCI832: Information Retrieval and Data Mining

Course Credit: 3
Semester: VII

Introduction:

Data mining is an interdisciplinary subject, and more appropriately named "knowledge mining from data". However, it is also known as knowledge discovery from data (KDD).

Course Objectives (Post-conditions) Knowledge objectives:

- Good knowledge to Mine Data from Large Amount of Data Sources
- You will be able to compare a two different data set and you can find out which one is better
- You will be able to apply many retrieval techniques on a given document
- You will be able apply some pattern matching algorithm and map the various expected pattern depend upon usage requirements

Application objectives:

Data Mining and Information Retrieval have tremendous advantages in term of their application areas which include; Financial Data Analysis, Retail and Telecommunication Industries, Intrusion Detection and Prevention, Bioinformatics and many more.

Expected Student Background (Preconditions)

Database Management Concepts, Probability and Basic Mathematical Concepts

Topics Outline:

Serial No.	Topics	Hrs
1	Introduction to Data Mining	1
2	Data Preprocessing	7
3	Data Generalization, Data Warehousing, and On-line Analytical Processing	8
4	Association Rule Mining and Frequent Patterns	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Classification and Prediction	4
6	Cluster Analysis	5
7	Introduction to Information Retrieval	1
8	Boolean Retrieval	2
9	Probabilistic Information Retrieval	3
10	Vector Support Machines	3
11	Pattern Matching Algorithm	2
12	Link Analysis	2
	Total Hours = 42	

Text Book(s):

1. Jiawei Han and Micheline Kamber, "Data Mining, Concepts and Techniques", Elsevier 2nd edition.
2. An introduction to Information Retrieval, 2008 Cambridge UP.
3. Thomas H. Corman, Charles E. Leiserson, and Ronald L. Rivest, Introduction to Algorithms,. The MIT Press,England, 1989.

Reference Book(s):

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining ", Pearson Education.
2. Richard O. Duda, Peter E. Hart, David G. Stork , "Pattern Classification", 2nd Edition, Wiley Publication, November 2000.
3. Rijsbergen C. J. ,"Information Retrieval" 2nd edition.

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	INTERNAL	25
		Total Marks: 100

Internal Marks Breakdown:

Assignments: 9 marks (3x3)
Quizzes: 12 marks (3x4)
Regularity: 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Introduction - 13B1WHS832 International Business Management

International Business and Trade is a complex system and navigating it is a challenging and exciting task. It is an integral part of the World Economic System and no country can survive without getting involved in it. Because of the forces of Globalization we cannot avoid the competition, even if we don't go out some other company from another country may come at our doorstep. Globalization of markets increases global competition and requires enterprises to continuously improve their performance to sustainably survive.

Political/Economic/Social/Technological/Environmental/Legal (PESTEL) conditions are different for different countries and it extremely important not only for managers but also for employees to understand the differences so that they can make an optimal decision.

Engineers substantially contribute to the success of an enterprise provided they understand and follow fundamental international market forces, economic basics and operational business management.
Therefore, one has to have a complete understanding of dynamics of International Business to survive successfully in the long run. The aim of the present course is to develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

13B1WHS832 International Business Management

Course Goal

To develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

Course Objectives

1. Understand different issues of International Business.
2. Analyze how different environment affects the business of a Multi National Companies.
3. Analyze the effect of changing dynamics of international business on Indian Economy.
4. Understand the importance of different theories of explaining international trade and businesses.
5. Understand the role of International Institutions in promoting and stabilizing the international integration.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

6. Design a suitable strategy for international trade, for a firm, depending upon the economic conditions of both home and host countries.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	13B1WHS832	Semester	VIII	
Subject Name	International Business Management			
Credits	3	Contact Hours	3	
Faculty (Names)	Coordinator(s)			
	Teacher(s) (Alphabetically)			
Module No.	**Subtitle of the Module**	**Topics**		**No. of Lectures**
1.	Introduction	Introduction and Basic Understandings of World Map		2
2.	Understanding Globalization	Globalization and International Business		3
3.	International Business Environment	a) Socio-Cultural Environment b) Political and Legal Environment c) Economic Environment		6
4.	International Trade and Investment Theories	a) International Trade Theories b) Foreign Exchange Markets c) Foreign Direct Investment d) Regional Economic Integrations		12
5.	Institutional Framework for International Business	a) WTO (GATT) b) The World Bank Group c) International Monetary Fund (IMF) d) UNCTAD e) Indian Institutions		9
6.	International Business Strategy	a) Organization and Strategy of International Business b) Country Evaluation and Selection c) Entry Strategy and Strategic		10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		Alliances (includes Export-Import, Direct Investments and Collaborative Strategies)	
		Total number of Lectures	42

Evaluation Scheme		
S.No.	**Component**	**Weightage**
1.	Test – 1 (1 Hr)	15
2.	Test – 2 (1 Hr 30 mins)	25
3.	Test – 3 (2 Hrs)	35
5.	Internal • Presentation • Class Participation • Attendance	 10 10 5

Recommended Readings	
1.	International Business by Daniels, Radebaugh, Sullivan and Salwan; Pearson **(Text Book)**
2.	International Business by Hill and Jain; TMH.
3.	International Business by Czinkota, Ronkainen and Moffet; Wiley.
4.	International Business by Cherunilam; PHI
5.	International Business by Justin Paul; PHI.
6.	International Business by Rakesh Mohan Joshi; Oxford.
7.	Newspapers, magazines and internet

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

14B1WHS832 International Human Resource Management

Course Goal

This course is designed to introduce students to the nature of managing human resources in multinational firms. It explores the complexities of IHRM and distinguishes international from domestic HR practices. The purpose of the course is provide students with an in-depth understanding of the basic problems inherent in IHRM to either prepare them for further work in the IHRM field or to give them a sound basis to understand the international corporate dimensions of their own careers. This course will help students identify differences in operating a domestic versus an international business and how business practices need to be adapted to operate successfully in foreign markets.

Course Objective:

1 .Students gain insight into and appreciation for the complexities and differences of operating a business in an international context as it applies to HRM.
2. Understand human resource management systems and their main challenges in multinational companies and improve their performance accordingly,
3. Efficiently implement specific IHRM activities in multinational companies,
4. Make better strategic decisions about people in international settings and
5. Design effective IHRM systems and practices for MNCs.
6..The course also facilitates cross-cultural sensitivity, systemic thinking, context screening, and ethical behavior in international setting

Detailed Syllabi

Lecture-wise Breakup

Subject Code	14B1WHS832	**Semester**	2
Subject Name	International Human Resource Management		
Credits	3	**Contact Hours**	3
Faculty (Names)	**Coordinator(s)**	1.Dr. Tanu Sharma	
	Teacher(s) (Alphabetically)		

Module No.	Subtitle of the Module	Topics	No. of Lectures

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Chapter	Topic		Hours
1	**Introduction** **Case** : NCR in Scotland	Defining International HRM Variables that moderate differences between domestic and international HRM Applying a strategic view of IHRM	3
2	**Internationalization of HRM :Socio-Cultural Contexts** **Case:** Oki UK ltd	National Culture and HRM HRM and its broad context National Culture and Specific HRM Issues Business imperatives and Other non – cultural influences on HRM	3
3	**National Context of HRM: case of 7 major economies** **Case** :Litton imports cell manufacturing from Sweden	Major economies and their HRM practices 1.HRM in Japan 2. HRM in the United States 3. HRM in the United Kingdom 4. HRM in Turkey 5. HRM in the Arab Middle East 6. HRM in India 7. HRM in China	5
4	**Staffing International operations for sustained global growth**	Approaches to staffing Transferring staff for international business activities The roles of an expatriate The role of expatriates Return on investment of international assignments The role of the corporate HR function in MNEs	3
5	**Recruiting and selecting staff for international assignments**	Issues in staff selection Factors moderating performance Selection Criteria Dual career couples Are female expatriates different?	3
6	**International training and development** **Case** : Seiko Instruments **Case** : Transfer of Knowledge in Oki-Training and development	The role of expatriate training Components of effective pre-departure training programmes The effectiveness of pre-departure training Developing staff through international	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

		assignments Trends in international training and development	
7	**International compensation** **Case** : News International plc	Objectives of international compensation Key components of an international compensation program Approaches to international compensation	3
8	**Re-entry and career issues**	The repatriation process Individual reactions to re-entry Multinational responses Designing a repatriation programme	3
9	**IHRM in the host country context**	Standardization and localization of HRM practices Factors driving standardization Factors driving localization Code of conduct- monitoring HRM practices in the host country Managing human resources in off shoring countrie	4
10	**International industrial relations** **Case :** Elementis and Michelin	Key issues in international relations Trade unions and international industrial relations The response of trade unions to multinationals Regional integration: the European Union	4
11	**Performance Management** **Case :** Tubular Industries Scotland Ltd.	Multinational performance management Performance management of international employees Performance appraisal of international employees	3
12	**IHRM trends: complexity, challenges and choices in the future** **Case :** Orgaon laboratories ltd, scotland	Strategic HRM: research issues and theoretical developments	3

Methodology

The format will emphasize capstone lectures, class discussion of assigned readings and other topics, in-class exercises, case analysis, and a group project.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation :

Exam	Marks
Test 1	15
Test 2	25
Test 3	35
Case study\Assignment\Presentations	25*

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Peter J. Dowling, Marion Festing & Allen D. Engle, SR.:International Human Resource Management (fifth Edition)
2.	D. Briscoe, R. Schuler, & I. Tarique (2012). **International Human Resource Management (4th Edition).** London/New York: Routledge.
3.	Jackson, T.: **International dimensions of human resource management.** London, 2002.
4.	Dessler, G.: **Human Resource Management**. 9th ed., New York, 2003.
5.	Harzing, A. W. & Ruysseveldt, J. (2004). **International human resource management (2th Ed.).** Sage Publication: London.
6.	Briscoe, D. R., Claus , L. M., Schuler , R. S. (2009). **International human resource management: Policies and practices for multinational enterprises.** Routledge

*Break up of internal marks

Internal marks	Total \25		
	Case Study 1	10	T1 /5
	Case Study 2	10	
	Case Study 3	10	T2/5
	Case Study 4	10	
	Case Study 5	10	T3/5
	Case Study 6	10	
	Presentations	10	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • ACCREDITED

Internet Marketing

COURSE CODE: 13B1WHS834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To develop the student's understanding on how the internet has become a necessity in modern business
2. Discover how this medium can assist in marketing. It
3. Examine the fundamental principles associated with the strategic adoption, implementation, use and evaluation of internet in organizations. Essentially, the focus is on
4. Understand how the internet can serve as an invaluable resource for the strategic business and competitive advantage.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the importance of Internet marketing	Familiarity
CO-2	Gain familiarity with fundamental marketing concepts	Assessment
CO-3	Develop Internet marketing mix	Assessment
CO-4	Evaluate modern day internet marketing technology	Usage
CO 5	To understand and decipher elements of electronic service quality and CRM	Assessment

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	**Marketing management Fundamentals:**	Concept, Segmentation, Targeting , Positioning, Marketing mix	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2.	**Introduction to Internet marketing** Relevance of the Internet to the modern marketing concept, Internet marketing, E-marketing, E-commerce and E-business, Differences between Internet marketing and traditional marketing. Internet & different marketing functions.	3
3.	**Internet micro and macro environment** Different elements of the Internet environment - competitor, customer and intermediary use of the Internet. Changes in business models enabled by e-commerce .Legal, moral and ethical constraints and opportunities on an organization. Social media marketing	5
4.	**Internet Marketing Mix** Internet marketing strategy to marketing and business strategy ,opportunities and threats arising from the Internet, elements of the marketing mix in an online context, characteristics of an online brand	4
5.	Consumer Behavior Online Changing Patterns of Consumer behaviour,Use of Market segmentation in Consumer Behaviour, Dimensions of Consumerism, Process of Motivation	4
6.	**Interactive marketing communications** Communications characteristics between digital and traditional media, methods for online and offline promotion. Importance of integrating online and offline promotion. methods of measuring site effectiveness	4
7.	**E-service quality** Different stages involved in creating a new site or relaunching an existing site. Design elements that contribute to effective web site content.Factors that are combined to deliver an effective online customer experience.	4
8.	**Customer relationship management** Concepts of relationship direct and database marketing on the Internet, potential of the Internet to support one-to-one marketing and the range of techniques and systems available to support dialogue with the customer over the Internet.	4
	Business-to-business Internet marketing Principal uses of the Internet in business-to-business markets. Impact of Internet technologies on buyer/supplier processes, relationships and markets.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Advanced Topics SEO, SEM, TEES, Commercial aspects of Cloud Computing, Big Data & Marketing Intelligence, E-Squal, Digital India	6
Total lectures		**42**

Suggested Text Book(s):

1. E-Marketing 5/E by Judy Strauss and Raymond Frost ©2009 Pearson Education, Inc. Publishing as Prentice Hall
2. Internet Marketing: Strategy, Implementation and Practice, 3/e by Dave Chaffey
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan

Other useful resource(s):

1. http://www.digitalindia.gov.in/
2. http://www.socialbeat.in/2016/07/19/digital-marketing-industry-report-india-2016/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment : 10 Class activities : 10 Attendance:5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	x	2	x	x	x	x	x	x	x	1	3	1	0.58

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO2	x	2	x	x	x	x	1	x	x	x	3	1	**0.58**
CO3	x	2	3	x	2	x	x	x	3	x	3	1	**1.17**
CO4	1	2	3	2	2	x	x	x	x	x	3	1	**1.17**
CO5	x	2	x	x	x	2	1	2	3	1	3	1	**1.25**
Average	**0.20**	**2.00**	**1.20**	**0.40**	**0.80**	**0.40**	**0.40**	**0.40**	**1.20**	**0.40**	**3.00**	**1.00**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Internet of Things Architecture and Design (OE)

15B1WCI832 - B.Tech CSE-IT 8th Semester

(Jan. – June 2016)

Instructor: Dr. Vivek Sehgal

Introduction:

The Internet of Things (IoT) is a global network that links physical objects using Cloud computing, web applications, and network communications. It allows devices to communicate with each other, access information on the Internet, store and retrieve data, and interact with users, creating smart, pervasive and always-connected environments.

Despite the Internet of Things being a relatively new concept, there are already a few open platforms available that enable remote and seamless management and visualization of sensor data: Cosm, Nimbits, and ThingSpeak are just a few examples. And Arduino works with all of them.

The Arduino is an incredibly flexible micro-controller and development environment that cannot only be used to control devices, but can also be used to read data from all kinds of sensors. Its simplicity and extensibility, in addition to its great success and adoption by users, has led to the development of a variety of hardware extensions and software libraries that enable wired and wireless communication with the Internet. Arduino is the ideal open hardware platform for experimenting with the world of the Internet of Things.

Readings:

1. Building Internet of Things with the Arduino: by CharalamposDoukas
2. Exploring Arduino: Tools and Techniques for Engineering Wizardry by Jeremy Blum
3. Getting Started with Intel Galileoby Matt Richardson
4. http://www.buildinginternetofthings.com/table-of-contents/chapter-1/
5. http://www.intel-software-academic-program.com/pages/courses#diy

Course Objectives (Post-conditions):

1. Make your Arduino with Intel Galileo talk to the world!

Knowledge objectives:

This course will provide students with all the information they need to design and create their own Internet of Things (IoT) applications using the Arduino platform.

More specifically, they will learn:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

1. About the Internet of Things and Cloud Computing concepts

About open platforms that allow students to store their sensor data on the Cloud (like Cosm, Nimbits and many more)

2. The basic usage of Arduino environment for creating their own embedded projects at low cost
3. How to connect their Arduino with their Android phone and send data over the Internet
4. How to connect their Arduino directly to the Internet and talk to the Cloud
5. How to reprogram their Arduino microcontroller remotely through the Cloud

Topics Outline:

1. **The Internet of Things**
2. **The Basics of Sensors and Actuators**
3. **An Introduction to Cloud Computing**
4. **The Arduino Microcontroller Platform**
5. **Reading From Sensors**
6. **Talking to your Android phone with Arduino**
7. **Connecting Your Arduino to The Internet**
8. **Introducing Cosm As A Cloud Service**
9. **Introducing The Nimbits Public Cloud Server**
10. **Reprogram Your Arduino Remotely From The Cloud**
11. **What One Can Connect to the Cloud: Project Ideas**
12. **Internet of Things with Intel Galileo**
13. **Mini computers for IoT**

Evaluation scheme:

For internal Assessment 3 quizes will be held. Best two will be taken with 10 marks each.

Test 1	15		
Test 2	25		
Test 3	35		
Internal	25	Attendance	-5 Marks
		Quizzes	-10 Marks
		Assignments	-10 Marks
Total	100	marks	

A student will need to get at least 22 marks out of a maximum of 75 (total) in the tests and 30 marks out of 100 in the overall total to be considered passed.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assignments

Assignment plan to include one assignment per week will be posted on the student resource separately. Students will be expected to submit the assignment as per expected time plan.

Ethics

During the course, students are expected to adhere to ethical standards expected of a professional. Any work you turn in has to be your own, written up by you personally. Honest behavior is expected at all times.

Good Luck on the course.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Linear Programming and Applications

COURSE CODE: 10B1WMA832

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Provide students with the basic mathematical concepts of linear programming problems
2. Provide student to formulate the LPP and conceptualize the feasible region.
3. Solve the LPP with two variables using graphical and simplex method.
4. Provide students to analyze the sensitivity of a decision variable.
5. Understand the concept of an objective function, a feasible region, and a solution set of an optimization problem.
6. Write down the dual linear programming problem.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand basic terms and Solve linear programming problems by graphical method.	Familiarity
CO-2	Solve linear programming problems by simplex, big M and Two phase methods.	Assessment
CO-3	Understand duality and dual simplex method.	Familiarity
CO-4	Understand assignment problem and method for solving it.	Familiarity
CO-5	Understand transportation model and finding solution of transportation problem.	Familiarity
CO-6	Solve Integer programming problems by different methods.	Usage
CO-7	Solving sequencing problems.	Usage
CO-8	Understand game theory, CPM and PERT.	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Linear Programming Problems (LPP):** Definition of LPP, Mathematical formulations of LP Models, Graphical Solutions of Linear Programming Problems (LPP)	4
2	**Linear Programming Problems (LPP):** Simplex Method, Artificial Variable Method, Two Phase Method, Charnes' Big-M Method	5
3	**Linear Programming Problems (LPP):** Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method	5
4	**Assignment Problems :** Definition, Hungarian Method for AP	4
5	**Transportation Problems :** Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method. Techniques for Obtaining Optimal Basic Feasible Solution	12
6	**Integer Linear Programming Problems :** Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method	5
7	**Sequencing Problem**: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, 2 Jobs and m machines problems	3
8	**Game Theory**: Concept of game; Two-person zero-sum game; Pure and Mixed Strategy Games; Saddle point,Odds Method; Dominance Method and Graphical Method for solving Mixed Strategy Game. CPM and PERT- network diagram-Events and activities- project planning reducing critical events and activities-critical path calculations	4
Total lectures		42

Suggested Text Book(s):

1. Taha,H.A.: Operations Research- An Introduction, Macmillan, New York 1992.
2. Sharma S.D.: Operations Research, Kedar Nath Ram Nath, 2003.

Suggested Reference Book(s):

1. Hadley, G.: Linear Programming, Massachusetts, Addison-Wesley, 1962.

Department of Mathematics

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2. Hiller, F.S. and Lieberman, G.J.: Introduction to Operations Research, Holden-Day, San Francisco 1995.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/111102012/
   https://nptel.ac.in/courses/109103021/

2. Link to topics related to course:
   i. https://nptel.ac.in/courses/111104027/
   ii. https://nptel.ac.in/courses/111102012/29
   iii. https://nptel.ac.in/courses/111102012/27

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (1) - 5 Quizzes (1) - 15 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	0	1	0	1	0	1	0	1	1	1.08
CO-2	3	3	2	0	1	0	0	0	1	0	1	0	0.92
CO-3	3	3	2	0	1	0	0	0	1	0	1	0	0.92
CO-4	3	2	1	1	1	0	1	0	1	0	1	1	1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

CO-5	3	2	1	1	1	0	0	0	2	0	1	1	**1**
CO-6	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
CO-7	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
CO-8	3	3	2	0	1	0	0	0	0	0	1	1	**0.92**
Average	**3**	**2.75**	**1.75**	**0.25**	**1**	**0**	**0.25**	**0**	**0.75**	**0**	**1**	**0.5**	

Department of Mathematics

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • ABOVE

Machine Learning

COURSE CODE: 18B1WCI634

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
4. Be able to design and implement various machine learning algorithms in a range of real-world applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in machine learning	Familiarity
CO-2	To learn about the definition of learning systems, their goals and applications in machine learning	Familiarity
CO-3	To understand concepts associated with classification and experimental evaluation of classification algorithms	Assessment
CO-4	To learn concepts associated with decision trees and experimental evaluation of classification algorithms	Assessment
CO-5	To learn about instance-based learning, clustering and unsupervised learning	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. **Inductive Classification:** The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.	5
2	**Decision Tree Learning:** Representing concepts as decision trees. Recursive induction of decision trees. **Picking the best splitting attribute:** entropy and information gain.Overfitting, noisy data, and pruning. Linear regression	5
3	**Artificial Neural Networks:** Neurons and biological motivation. Perceptrons. Multilayer networks and back propagation. **Bayesian Learning:** Probability theory and Bayes rule. Naive Bayes learning algorithm. Logistic regression	5
4	**Support Vector Machine**. Kernel function and Kernel SVM **Instance-Based Learning:** Constructing explicit generalizations versus comparing to past specific examples. k-Nearest Neighbor algorithm. Case-based learning.	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Genetic Algorithm and Evolutionary Algorithms Introduction.** Representing hypothesis, Genetic Operators, Fitness function and selection. Hypothesis space search Genetic Programming	6
6	**Clustering and Unsupervised Learning:** Learning from unclassified data. Hierarchical Agglomerative Clustering. k-means partitioned clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.	6
Total lectures		**32**

Suggested Text Book(s):

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin.

Suggested Reference Book(s):

1. Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006
2. T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.
3. Ian H. Witten & Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufmann, 1999.
4. S. M. Weiss & C. A. Kulikowski, "Computer Systems that Learn", Morgan Kaufman Publishers, San Fancisco, CA, 1991

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs40/preview
2. Link to topics related to course:
   i. https://in.udacity.com/course/intro-to-machine-learning--ud120-india
   ii. https://www.edx.org/learn/machine-learning
   iii. https://www.datacamp.com/courses/introduction-to-machine-learning-with-r
   iv. https://www.simplilearn.com/big-data-and-analytics/machine-learning-certification-training-course

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.8	2.8	2.2	2	2.2	3	1	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Design of Modern Antennas

COURSE CODE: 18B1WEC852

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Transmission lines and E.M waves.

Course Objectives:

The main objective of the course is to

1. Learn the mechanism of antenna, antenna performance parameters.
2. Design and analysis of various antennas for different applications.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To define overall needs and constraints of RF systems and antennas.	Familiarity
CO-2	To understand the mechanism of antenna radiation.	Familiarity
CO-3	To design and analyze various antennas for specific application.	Usage
CO-4	Size reduction techniques, Broad banding and multi band operation techniques in antenna design.	Usage
CO-5	Evaluate the opportunities involving technology, a product or a service required for developing a startup idea.	Assessment

Course Contents:

Unit	Contents	Lectures required
1.	Introduction: antenna types, radiation mechanism, use of potential functions, radiated field, far field, antenna parameters, radiation pattern, directivity, numerical evaluation of directivity, gain, efficiency, impedance, loss resistance, polarization, linear polarization, circular and elliptic polarization, equivalent area, Friss equation.	6
2.	Dipole Antennas: Potential functions for analysis of radiated fields, Duality theorem, Reciprocity theorem for antennas, Radiation from current element, infinitesimal dipole, finite length dipole, half wave dipole	6
3.	Antenna Arrays: Analysis and Synthesis Review of antenna array basics, Linear arrays, circular array, planar (2D) arrays, sum and difference patterns, Effect of mutual couplings, Phased array antennas, scan Principles, Non uniform arrays, Dolph Chebyshev Arrays Binomial Arrays.	6
4	Broadband and Frequency Independent Antennas Helical antenna: Normal mode and axial mode helix Spiral antennas, Log Periodic antennas.	5
5.	Aperture Antennas Radiation from an aperture in an infinite ground plane, Radiation from rectangular and circular apertures, Radiation from a slotted rectangular waveguide Horn antenna: E plane and H plane sectoral horns, Pyramidal horn, Conical horn Reflector antennas parabolic reflector, methods of analysis, dual reflector antennas, offset reflector antenna, gain and efficiency calculations, scanning properties and cross polarization Lens antennas and their applications	7
6	Microstrip Antennas Rectangular patch antenna: cavity and transmission line models, Circular patch antenna Coupling mechanisms, circular polarization, Microstrip arrays, Broadband and Multi band microstrip antennas, Compact Microstrip Antennas.	7
7	Dielectric Resonator Antennas Introduction, radiation mechanism, advantages of DRA, types of DRA, feeding techniques, design method, modes.	5
Total lectures		42

Suggested Text Book(s):

1. Constantine A. Balanis: Antenna Theory Analysis and Desin, John Wiley, 3rd Edition, 2009.
2. Antennas for All Applications, J. D. Kraus and R. J. Marhefka, McGraw-Hill, Inc, 3rd Ed., 2007.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • ADDITIONAL

3. Rectangular Dielectric Resonator Antennas, Rajveer S. Yaduvanshi Harish Parthasarathy, Springer, 1st Ed, 2016.

Suggested Reference Book(s):

1. Antennas and Radio wave Propagation, R. E. Collin, McGraw-Hill, Inc, 3rd Ed, 2005.
2. Modern Antenna Design, T. A. Milligan, John Wiley & Sons, 2nd Ed., 2005.
3. Antenna Arrays, R. L. Haupt, John Wiley & Sons, Inc., 1st Ed., 2010.
4. Antenna Theory and Microstrip Antennas, D. G. Fang, CRC Press, 1st Ed., 2009.

Other useful resource(s):

Link to NPTEL course contents

1. https://nptel.ac.in/courses/108101092/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Design of Modern Antennas)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	2	1	1	1	2	2	2	2.2
CO-2	2	3	3	3	2	2	1	1	2	1	1	2	1.9
CO-3	2	2	2	3	2	2	1	1	1	2	1	3	1.8
CO-4	2	2	3	3	2	1	1	2	2	2	2	2	2
CO-5	2	2	3	3	3	2	1	1	2	2	1	2	2
Average	2.2	2.4	2.8	3	2.4	1.8	1	1.2	1.6	1.6	1.4	2.2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Nano-Biotechnology

COURSE CODE: 18B1WBT633

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic of Physics, Chemistry and Biology

Course Objectives:

1. Introduction to Nanomaterial and various material used for obtaining nano-materials
2. Learn various approaches or methods used for nanomaterial synthesis.
3. To learn various analytical techniques used for nanomaterial characterization.
4. Learn various applications of nanomaterial in health care, agriculture and environmental monitoring

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduction to Nano (Basics to Nanoscience and Nanotechnology)	Familiarity
CO-2	Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterial and fundamental properties of Nano-materials(Nano-effect)	Assessment & Technical
CO-3	Introduction to various technique used for the characterization of nanostructures and nanomaterial.	Assessment & Technical
CO-4	Fundamental understanding of nanomaterial/nano-biotechnological application in health and disease.	Usage
CO-5	Fundamental understanding of nanomaterial/nano-biotechnological application in Environment and food - detection and mitigation	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction, History &Applications:**Various definitions and Concept of Nano-biotechnology & Historical background. Fundamental sciences and broad areas of Nano-biotechnology. Various applications of Nano- biotechnology, Cell – Nanostructure interactions	6
2	**Synthetic methodologies:**Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterials: Lithography method, Electrochemical method, Mechanical Method, Chemical Synthesis, Chemical vapour deposition, Molecular self-assembly, Laser Induced assembly.	10
3	**Techniques used for the characterization of nanoparticles:**Principles of microscopy-light, electron, fluorescent confocal, scanning and transmission microscopes, different fixation and staining techniques for	13
	EM. Principles of spectroscopy-UV, visible, CD, FTIR, NMR, and ESR spectroscopy, structure determination using X-ray diffraction, analysis using light scattering.	
4	**Nano-biotechnologicalapplications in health and disease:**Properties of different types of nanoparticles normally used in health and disease. Diagnostics and theranostics application of nanomaterials in health sciences.	6
	Nanobiotechnological applications in Environment andfood - detection and mitigation: Properties of different types of nanoparticles normally used in	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	environmental and food sciences. Detection and removal of toxic metal ion from polluted sample and detection and removal of pathogen form food sample.	7
Total Lectures		**42**

Suggested Text Book(s):

1. C. A. Mirkin and C. M. Niemeyer. Nanobiotechnology - II more concepts and applications. (2007) - Wiley VCH.
2. P. Boisseau, P. Houdy, M. Lahmani, Nanoscience: Nanobiotechnology and Nanobiology

Suggested Reference Book(s):

1. A. Nouailhat, An Introduction to Nanoscience and Nanotechnology, Wiley
2. D.A Phoenix, W. Ahmed, Nanobiotechnology, One Central Press Ltd, UK
3. L. Filipponi, D. Sutherland, Nanotechnologies: Principles, Applications, Implications and Hands-on Activities.Directorate- European commission

Other useful resource(s): Link to NPTEL course contents

- https://nptel.ac.in/courses/118107015/
- https://onlinecourses.nptel.ac.in/noc17_bt17/preview
- http://videos.gitam.edu/nptel/nano.html

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Course Outcomes (COs) contribution to the programme Outcomes (POs):

Course outcomes (NanoBiotech.)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	1	2	3	2	1	1	1	2	2	1.7
CO-2	2	3	2	2	3	2	2	2	1	1	3	2	2.1
CO-3	3	3	2	2	3	2	2	2	1	1	3	2	2.2
CO-4	2	2	3	3	2	3	2	2	2	2	3	2	2.3
CO-5	2	2	3	3	2	3	3	2	2	1	3	2	2.3
Average	2.2	2.4	2.2	2.2	2.4	2.6	2.2	1.8	1.4	1.2	2.8	2.0	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Network Management

COURSE CODE: 18B1WCI845

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Computer Networks, Cryptography and Network Security

Course Objectives:

1. Learn to develop applications to manage Networks.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Become familiar with the Network Management Standards	Usage
CO-2	Understand the SNMP protocols	Usage
CO-3	Understand how large-scale Network Management Systems operate	Usage
CO-4	Understand how large-scale Network Management Systems are configured	Usage
CO-5	Advanced network Management Tools and Systems	Assessment
CO-6	Web Based Network Management Systems	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Data Communications and Network Management Overview** Review of Computer Network Technology, Basic Foundations of Network management, standards, models and languages	10
2	**Network Management Models** SNMP v1 Organisation and Information models, SNMP v1 Communication and functional Models, SNMP v2, SNMP v3, SNMP management RMON	14
3	**Network Design** Design of Data Communication Networks, Design of Tele Communication Networks, Design of Trasportation networks	6
4	**Broadband Network Management:** ATM Networks, Broadband Network Management: Access Networks, TMN	6
5	**Network Management Tools:** Network Management Tools systems and applications, Network Management applications	4
6	**Web Based Network Management:** Ubiquitous Web Based Network Management	2
Total lectures		42

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Suggested Textbook:

1. Mani Subramanian., Pearson Education, *Network Management Principals and Practices*

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Network Managemen)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	2.5
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	2.6
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	2.4
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	2.5
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	2.4
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	2.6
Average	2.7	2.2	2.7	2.2	2.5	2.5	2.5	2.5	2.2	2.7	2.8	2.7	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Optical Communication Systems

COURSE CODE: 18B1WEC633

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisite: Communication Systems

Course Objectives:

1. To understand the constituents of the fiber optics communication system and optoelectronics.
2. To have an in depth knowledge of practically used optical communication systems

Course Outcomes:

S.No.		Level of Attainment
CO-1	Understand basics of optical communication systems.	Familiarity
CO-2	The principles that govern optical communication systems.	Familiarity
CO-3	Behavior of light as electromagnetic waves in different types of fibers.	Assessment
CO-4	The hardware components required to implement optical communication systems.	Assessment
CO-5	To efficiently design an optical communication system for practical purpose.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Optical fiber waveguides :** Historical development The general system Advantages of optical fiber communication, Ray theory transmission, Electromagnetic mode theory for optical propagation, Cylindrical fiber, Single-mode fibers	6
3	**Transmission characteristics of optical fibers** Attenuation, Material absorption losses in silica glass fibers, Linear scattering losses ,Nonlinear scattering losses, Fiber bend loss , Mid-infrared and far-infrared transmission, Dispersion Chromatic dispersion , Intermodal dispersion , Overall fiber dispersion, Dispersion-modified single-mode fibers , Polarization	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

5	**Optical sources** : The laser , Basic concepts , Optical emission from semiconductors, The semiconductor injection laser , the light-emitting diode ,LED power and efficiency, LED structures, LED characteristics Modulation	6
	Optical detectors: Device types Optical detection principles Absorption Quantum efficiency Responsivity, Long-wavelength cutoff Semiconductor photodiodes without internal gain	6
6	**Optical fiber connection:** joints, couplers and isolators, **Optical fiber systems**,: intensity modulation/direct detection	3
Total lectures		28

Suggested Text Book(s):

1. Optical Fiber Communications, John M Senior, 3rd Edition, PHI, 2009.
2. Fiber Optic Communication Systems, Govind P. Agarwal, 4th Edition, Wiley, 2010.
3. Fiber Optics and Optoelectronics, R.P. Khare Oxford University Press, 2015

Suggested Reference Book(s):

1. Fiber Optic Communications, S. Kumar and M. J. Deen, Wiley, 2014.
2. Optical Fiber Communications, G. Keiser, 5th Edition, Tata McGraw Hill, 2009.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/117101002/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course outcomes (Optical Communication Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.75
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.75
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.08
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	2.08
Average	2	2.66	2.66	2.66	2.66	1	1	1	2	2.5	1.66	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Detailed Course Curriculum (Theory)

Course Name: R Programming

Course Code: 18B1WCI842

Course Credit: L:2 T:0 P:0

Course Pre-requisites (if any): Basic Programming Language Knowledge, Flow Charts

Course Objectives: R is open source free software that can handle mathematical and statistical manipulations. R Programming has its own programming language constructs like other languages as well as built in functions to perform any specialized task. This course will cover the concept how to program in R and how to use R for effective data analysis. The students will be able to understand how to install and configure R and how it could be used for an analytics programming environment and gain basic analytic skills via this high-level analytical language. **Upon completion of this course students should be able to:**

1. Introduction and Usages of R Programming

2. How to install R Software and How to use the packages in R Software

3. How to do data management for different applications using R Software

4. Able to draw the Graphs and Plots for better visualization of real life problems.

5. Able to know how the different real applications could be converted according to R Programming Environment for better data analysis.

Detailed Course Contents:

Module	Contents	Lectures required
Module 1	Introduction and History of R Programming, Basic fundamentals, installation and use of software, data editing, use of R as a calculator, functions and assignments.	**4**
Module 2	Use of R as a calculator application, functions and matrix operations in R, missing data and logical operators. Conditional executions and loops in R, data management with sequences.	**6**
Module 3	Data management with repeats, sorting, ordering, and lists Vector indexing, factors, Data management with strings, display and formatting.	**6**
Module 4	Data management with display paste, split, find and replacement, manipulations with alphabets, evaluation of strings, data frames.	**6**
Module 5	Data frames, import of external data in various file formats, statistical functions, compilation of data.	**4**
Module 6	Graphics and plots, statistical functions for central tendency, variation, skewness and kurtosis, handling of bivarite data through graphics, correlations, programming and illustration with examples.	**6**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	A Mini Project for Implementation of a Application in R Programming	
TOTAL LECTURES		**32**

Suggested Text Book(s):

1. Hands-On Programming with R, by Garrett Grolemund, Shroff/O'Reilly; First Edition (2014)

2. Beginning R: The Statistical Programming Language, by Mark Gardener, Wiley (2013)

Suggested Reference Book(s):

1. Benjamin M. Bolker. Ecological Models and Data in R. Princeton University Press, 2008. ISBN 978-0-691-12522-0.
2. Peter Dalgaard. Introductory Statistics with R. Springer, 2nd edition, 2008. ISBN 978-0-387-79053-4.
3. Brian Everitt and Torsten Hothorn. A Handbook of Statistical Analyses Using R. Chapman & Hall/CRC, Boca Raton, FL, 2006. ISBN 1-584-88539-4.
4. John Maindonald and John Braun. Data Analysis and Graphics Using R. Cambridge University Press, Cambridge, 2nd edition, 2007. ISBN 978-0-521-86116-8.
5. Paul Murrell. R Graphics. Chapman & Hall/CRC, Boca Raton, FL, 2005. ISBN 1-584-88486-X.
6. Phil Spector. Data Manipulation with R. Springer, New York, 2008. ISBN 978-0-387-74730-9.
7. W. N. Venables and B. D. Ripley. Modern Applied Statistics with S. Springer, New York, fourth edition edition, 2002.
8. Alain Zuur, Elena N. Ieno, Neil Walker, Anatoly A. Saveiliev, and Graham M. Smith. Mixed Effects Models and Extensions in Ecology with R. Springer, New York, 2009. ISBN 978-0-387-87457-9.
9. Alain F. Zuur, Elena N. Ieno, and Erik Meesters. A Beginner's Guide to R. Use R. Springer, 2009. ISBN: 978-0-387-93836-3.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_ma17/preview
2. Link to topics related to course:
   a. **https://www.coursera.org/learn/r-programming**
   b. **https://www.edx.org/course/data-science-r-basics**
   c. **https://www.edx.org/learn/r-programming**

Course outcomes:

1. To identify the usages of available R packages and associated Open Source software to meet different scientific objectives
2. To understand how to programming in R, reading data into R, accessing R packages,
3. Able to write R functions, debugging, profiling R code, and organizing and commenting R code.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4. To design and write efficient programs using R to perform routine and specialized data manipulation/management and analysis tasks
5. To do data analysis using R for real life applications.

Course Outcome (CO)

Sr. No.	Course outcomes (R Programming) (Subject Code: XXX)	Level of Attainment
CO-1	To identify the usages of available R packages and associated Open Source software to meet different scientific objectives	Familiarity
CO-2	To understand how to programming in R, reading data into R, accessing R packages,	Technical skills
CO-3	Able to write R functions, debugging, profiling R code, and organizing and commenting R code.	Computational skills
CO-4	To design and write efficient programs using R to perform routine and specialized data manipulation/management and analysis tasks	Computational skills
CO-5	To do data analysis using R for real life applications.	Technical skills & Assessment

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (R Programming) (Subject Code: XXX)	Level of Attainment	PO - 1	PO - 2	PO - 3	PO - 4	PO - 5	PO - 6	PO - 7	PO - 8	PO - 9	PO -10	PO -11	PO -12	Weightage
To identify the usages of available R packages and associated Open Source software to meet different scientific objectives	Familiarity	M	M	L	M	L	M	M	M	M	L	L	M	15
To understand how to programming in R, reading data into R, accessing R packages	Technical skills	H	H	H	H	H	M	M	M	M	L	L	H	15
Able to write R functions, debugging, profiling R code, and	Computational skills	H	H	H	H	M	M	L	M	H	M	H	H	25

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

organizing and commenting R code														
To design and write efficient programs using R to perform routine and specialized data manipulation/management and analysis tasks	Computational skills	H	H	H	H	M	M	L	M	H	M	H	H	25
To do data analysis using R for real life applications.	Technical skills & Assessment	H	H	H	H	H	M	M	M	M	L	L	H	20
Weightage														100

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology, Waknaghat

COURSE DESCRIPTION

Course Name:	SECURE WEB APPLICATION DEVELOPMENT
Course Code:	18B1WCI838
Course Credits:	3 (3-0-0)
Branch and Semester:	B.Tech
Session:	Jan-May 2019
Last updated on:	
Faculty Coordinators:	Rizwan ur Rehman

Pre-requisite Course: Web Technology, Computer Network, Network security

Description & Rationale:

Web application security is a branch of Information Security that deals specifically with security of websites, web applications and web services. At a high level, Web application security draws on the principles of application security but applies them specifically to Internet and Web systems.

Objectives:

- To understand how secure web development can be used as an effective tool in providing assurance concerning privacy and integrity of web Application.
- To understand the concept of web application security.
- To describe the different types of Threats and Attacks to web application and web services.
- To provide skills to design secure web applications.
- To develop skills necessary to help organizations in designing, testing and implementing well-planned information security measures for web application.
- To understand the concept of Bot and Botnet.

Course Outcomes:

S.NO	Course outcomes (Web Application Security)	Level of Attainment
CO-1	To understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given web application.	Familiarity
CO-2	To gain knowledge on the notions of various types Threats and Attacks to web Application	Familiarity
CO-3	To understand and analyze the various preventive and defensive techniques, their principles and applications.	Familiarity and Assessment
CO-4	To identify and analyze the applications of security techniques and technologies in solving real life security problems.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-5	To understand, analyze and evaluate the security of Web application	Familiarity, Usage and Assessment
CO-6	To analyze and interpret the mechanisms to provide security for Web Application.	Assessment

Course Contents / Lecture Plan:

S.No.	Topics	Hrs.
1	**Introduction:** Introduction to Web Application security, network security versus Application security, Open Web Application Security Project (OWASP), OWASP Top Ten List, Security fundamentals, Input validation, Black list validation, white list validation, Attack surface reduction, classifying threats, STRIDE, CIA,CWE,CWSS	5
2	**Web Application Security Principles:** **Authentication:** Access Control overview, Proving your Identity, Two factor and Three factor Authentication, web application Authentication, Password based authentication, Validating credentials **Authorization:** Authorization goals. Session management, Types of permission, Authorization layers, Client Side Attack	4
3	**Browser Security Principles:** **The same origin policy:** Defining the same origin policy, client side vs Server side, A world without the same origin policy **Cross site scripting (XSS):** Reflected XSS, Post based Reflected XSS ,Stored XSS, Local XSS **Cross-Site Request Forgery (CSRF):** HTTP GET and the concept of safe method	3
4	**Database Security Principles:** Structured query language (SQL) Injection, SQL Injection effects Confidentiality Integrity Availability Blind SQL Injection, Solving the problems, Validating Input, Regular expression, SQL Injection in stored procedure	3
5	**File Security Principles:** Keeping Your Source Code Secret, Static Content And Dynamic Content, Revealing Source Code, Interpreted Vs Compiled Code, **Security Through Obscurity:** Obfuscation , Code Obfuscation, HTML Obfuscation, Java Script Obfuscation, Levels of Obfuscation	6
6	**BOT :** Overview of Bot, Taxonomy of Bots, Basic Bot versus Advanced Bots, Good Bots versus Bad Bots, Web Crawler, Social Media Bot, Chatbot, Informational Bot, Bad Bots (Web Scrapper, Spammer, Vulnerability Scanner, Impersonator), Generalized Bot versus Specialized Bot, Bot Traffic.	4
7	**Threats of Bot to Web Applications:**	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Web Scraping, Transactional Fraud, Accounts -linked attacks (Semantic attacks) , Security Breach, Skewed Analytics, Content scraping, Price Scarping, database, Scraping, Click Fraud, E-Mail Spamming, Form Spamming, Man in the Browser Attack, Credential Stuffing, Account Takeover, False Accounts, Account Lockout,	
8	**BOTNET:** Overview of BOTNET, Evolution of Botnet, Botnet classification according to their architectures, Centralized Botnet Architecture, Decentralized Botnet Architecture, BOTNET Threats to Web application, DoS, DDoS, Bitcoin Mining, Phishing and its types	4
9	**Defense Mechanism against Web Application Attacks:** **Preventive Approaches:** CAPTCHA, Text CAPTCHA, Image CAPTCHA, Puzzle CAPTCHA, Audio CAPTCHA, Honey Pot, Code Obfuscation **Detective Approaches:** Mining Learning based Approaches.	4
10	**Secure Development and Deployment:** The Penetrate And Patch Approach, Threat Modeling, Secure Code Libraries, Code Review, Security Testing, Security Incident Response Planning, Industry Standard Secure Development Methodology And Maturity Model, Security Development Life Cycle,	5
	Total	**42**

Maintenance of Records:

Students are expected to keep records of homework assignments (to be posted on students' resource from time to time) neatly in suitable hard bound notebooks separately. The same will be submitted on or before the scheduled time.

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. These are further explored and expanded through a series of laboratory-based sessions. A project problem is to be taken up and implemented as a continuous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Tools and Technologies:

Webgoat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (5) - 9 Quizzes (5) - 12 Attendance - 4

Text Book(s):

T1: 'Web Application security by Bryan Sullivan and Vincent Liu, 6th Edition, TMH
T2: 'Developer's Guide to Web Application Security' by Michael Cross

Reference Book(s):
R1: 'Network Security Essentials' by William Stallings, 4th Edition, Pearson Publication

Additional Resources :

A. Web Resources:
https://www.owasp.org
https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8013
https://link.springer.com/journal/145

B. Course Material:

Lecture presentations and assignments will be posted on the student resource from time to time. In addition following additional online/downloadable resources will be useful.

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	H	M	M	L	M	M	M	L	M	H	H	M	71%
CO-2	H	H	H	M	M	M	H	M	M	L	M	M	74%
CO-3	H	H	M	L	L	H	H	H	H	H	L	L	74%
CO-4	H	M	M	L	M	H	M	M	L	H	L	M	63%
CO-5	H	M	M	L	M	H	H	M	L		M	L	77%

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

										M			
CO-6	H	H	M	L	L	M	H	L	H	H	H	L	75%
Weightage	85 %	75%	74%	65%	67%	77%	76%	64%	71%	79%	69%	62%	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Course Outcomes (COs) contribution to PSOs

Attainment of PSOs through COs					
Sr No	PSO-1	PSO-2	PSO-3	PSO-4	Weightage
CO-1	H	M	M	L	70%
CO-2	H	H	M	M	75%
CO-3	H	M	L	M	70%
CO-4	H	M	H	H	77.5%
CO-5	H	M	M	L	70%
CO-6	M	H	M	H	75%
Weightage	78.3%	73.3%	70%	70%	

Program Specific Outcomes*	
PSO-1	Detailed Knowledge of contemporary issues in CSE
PSO-2	Strong skills in learning new programming environments.
PSO-3	Ability to analyze, design, model, develop, test and manage complex software and information management systems.
PSO-4	Analyzing the impact of Computer Science and Engineering solutions in the societal and human context.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

*A CSE graduate will achieve the above mentioned PSOs. PSO-1 will be assessed based on advanced level courses done in seventh and eighth semesters. PSO2-4 will be assessed based on the performance in Project Components.

Signature of Faculty

Remarks of HOD

Signature of HOD

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE DESCRIPTION

Course Name: Service Oriented Architecture

Course Code: 13B1WCI831

Course Credits: 3

Branch and Semester: B Tech CSE and IT – 8th Semester

Session: January - June, 2017

Course Coordinator: Dr. P.K. Gupta

Course Objectives:

- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design

Course Contents:

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Basics	Basics of Software Engineering and	3
	Architecture	Software Architecture	5
2	Unit I	Roots of SOA–Characteristics of SOA-Comparing SOA to client-server and distributed internet architectures–Anatomy of SOA-How components in an SOA interrelate-Principles of service orientation	6
3	Unit II	Web services–Service descriptions–Messaging with SOAP–Message exchange Patterns–Coordination–Atomic Transactions–Business activities–Orchestration–Choreography-Service layer abstraction–Application Service Layer–Business ServiceLayer–Orchestration Service Layer	6
4	Unit III	Service oriented analysis–Business-centric SOA–Deriving business services-service modeling-Service Oriented Design–WSDL basics–SOAP basics–SOA composition guidelines–Entity-centric business service design–Application service design–Task-centric business service	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		design	
5	Unit IV	SOA platform basics–SOA support in J2EE–Java API for XML-based web services (JAX-WS)-Java architecture for XML binding (JAXB)–Java API for XML Registries (JAXR)-Java API for XML based RPC (JAX-RPC)-Web Services Interoperability Technologies (WSIT)-SOA supportin .NET–Common Language Runtime-ASP.NETweb forms–ASP.NETweb services–Web Services Enhancements (WSE)	8
6	Unit V	WS-BPEL basics–WS-Coordination overview-WS-Choreography, WS-Policy, WS-Security.	6
Total number of Lectures			**40**

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	Test 1 (T1)	15	1 hr.	Syllabus covered up to T1 Test
2	Test 2 (T2)	25	1.30 hr.	Mainly syllabus covered after T1 Test, plus some questions from portions covered up to T1 Test.
3	Test3 (T3)	35	2 hr.	Mainly syllabus covered after T1 and T2 Test, plus some questions from portions covered up to T1 & T2 Test.
4	Assignments/ Quizzes/Home work/Regularity in Attendance	25	Entire Semester	5 + 10 + 5 + 5 = 25 M arks.
Total =	**100**			

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

References:

1. Applied SOA: *service-oriented architecture* and design strategies / Mike Rosen (2008) (***ebook***)
2. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
3. Newcomer, "Understanding SOA with Web Services", Pearson Education, 2005.
4. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
5. Dan Woods and Thomas Mattern, " Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

SOFT COMPUTING TECHNIQUES

(Elective Subject)

Course Code:	13B1WEC831	Semester:	8th Semester, B. Tech (ECE), M.Tech(Ist year)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes

Upon completion of the course, the student are expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to fuzzy set theory: Probabilistic reasoning, Fuzzy sets, mathematics of fuzzy set theory, operations on fuzzy sets, comparision of fuzzy and crisp set theory.	Ross Ch 1,2 Sivanandam Ch 7,8	4
2.	Fuzzy mapping: one to one mapping, max-min principle, extension principle, implication rules – mamdani implications. Membership functions: Universe of discourse, mapping inside fuzzy domain, fuzzy membership mapping methods, and application to real world problems.	Ross Ch 2,3 Sivanandam Ch 9,10	10
3	Artificial Neural Networks (ANN) and their biological roots and motivations. Comparison	Sivanandam Ch1,2	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Between Artificial and Biological Neural Networks, Applications of Neural network. Network Architecture ,Taxonomy of neural networks: feed forward and recurrent networks with. Merits and limitations of neurocomputing.	Haykin Ch1,2	
4	Types of learning, supervised and unsupervised learning laws . Learnig Laws : Hebb's rule, Delta rule, Widrow - Hoff (The Least-Mean-Square) learning rule, correlation learning rule, instar and outstar learning rules, Competitive learning, Credit Assignment Problem, Error Correction learning, Memory based learning, , Boltzmann learning.	Sivanandam Ch 3 Haykin Ch 3,4	10
5	The Perceptron and its learning law, Classification of linearly separable patterns, Multi-Layer Perceptron, Supervised Learning, Back-Propagation Learning law. Feed forward networks, Recurrent Networks.	Sivanandam Ch 3 Haykin Ch 4	6
6	Winner takes-all Networks, Competitive Learning, Kohonen's Self organizing Maps, Introduction to Adaptive Resonance Theory.	Sivanandam Ch 5	4
		Total Number of Lectures	44

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance &Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1.Simon Haykin, "*ArtificialNeutral Networks*".
2. Yegna Narayanan, *"Artificial Neural Networks"*.
3. Timothy J. Ross, " *Fuzzy Logic with Engineering Applications"*.
4. S.N.Sivanandam, S.N Deepa, "*Principles of Soft Computing*"

Reference Books

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Bart Kosko, "Neural Network and Fuzzy Systems: A Dynamic System Approach to Machine" Prentice-Hall 1998
2. L. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications", Prentice-Hall, 1994
3. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002.

ONLINE MATERIAL

http://nptel.ac.in/courses/117105084/

http://nptel.ac.in/courses/108104049/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Storage Networks

COURSE CODE: 18B1WCI736

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: None

Course Objectives:

1. To learn the ability to design and implement the various aspects of storage networks.
2. To know the design model SAN, NAS, DAS, CAS, etc.
3. To learn the various technologies like SCSI, Fibre Channel, INFINIBAND, IP Stoarge etc.
4. To learn the concepts of virtualization.
5. To learn the protocols of Distributed storage networks.

Course outcomes:

S.NO	Course Outcomes	Level of Attainment
CO-1	Basics of Storage networks	Familiarity
CO-2	Design and Implement the RAID Levels.	Assessment
CO-3	Discussing algorithms related to storage networks.	Assessment
CO-4	Designing the SAN, NAS, CAS, and DAS based storage networks	Assessment
CO-5	Concepts of Data Deduplication, and File Systems.	Assessment
CO-6	Discussion of advanced topics of Distributed storage networks, protocols, and architecture.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Intorduction to Storage Technology:** Data proliferartion, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Basic storage management skills and activities.	6
2	**Technologies for Storage Networks:** Disk Subsystems, Overview Architecture of Intelligent Disk Subsytem, JBOD: Just A Bunch Of Disks, RAID & RAID Levels, Hot Sparing, Hard Disks and Internal I/O Channels, Caching: Acceleration of Hard Disk Access.	8
3	**I/O Techniques:** DAS, SAN, NAS, evolution, Storage Area Networks (SAN): elements & connectivity, Fibre Channel SAN & Products, IP SAN Technology & Products, IP SAN elements, standards (iSCSI, iFCP, mFCP, FCIP and iSNS), Migration from SCSI and Fibre Channel to IP storage, Network attached Storage: elements & connectivity.	10
4	**Management of Storage Networks:** Requirements of Management Systems, Management Interfaces Standardized and Proprietary Mechanisms, In-	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	band & Out- band Management.	
5	**Storage Virtualization:** The concept of storage virtualization, Storage virtualization on various levels of the storage network, Symmetric & Asymmetric Storage virtualization, Performance of SAN virtualization, Scaling storage with virtualization.	7
6	**Distributed Storage Networks:** Architecture, Protocols Applications, Data Deduplications, File Systems	5
Total lectures		**42**

Suggested Text Book(s):

1. **Storage Networks Explained"**, Ulf Troppens, Rainer Erkens, ISBN 0-470-86182-7, John Wiley& Sons.

Suggested Reference Book(s):

1. "Storage Networks: The Complete Reference", R. Spalding, ISBN:0072224762, McGraw-Hill
2. "Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and Filing Systems", Marc Farley, ISBN: 1-58705-162-1, Cisco Press.
3. "Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs, Second Edition", Tom Clark, ISBN: 0-321-13650-0, Addison Wesley

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	45	2 hours	Syllabus covered upto Test-3
3.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Storage networks)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	**2.4**
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	**2.5**
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	**2.4**
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-6	3	3	3	2	3	3	2	2	1	3	1	3	**2.4**
Average	**3**	**3**	**3**	**2**	**2.7**	**2.8**	**2**	**2**	**2.3**	**3**	**1**	**3**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

UNDERSTANDING INIDA: LITERARY REFLECTIONS

COURSE CODE: 18B1WHS636

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite : None

Course Objectives:

1. To understand migration and its impact on individuals.
2. To recognize the impact of displacement on individuals.
3. To explore social, economic, cultural and geographical contexts and its relevance for a holistic living.
4. To look for roots and connections in literature with focus on environment and peace in society.
5. To access the impact of gender on migration.
6. To define identity and what it means in the modern context.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
1	Analyze the reason and impact of migration and displacement	Familiarity
2	Explore and understand the socio-cultural and geographical contexts for a holistic living	Assessment
3	Demonstrate familiarity with gender issues	Assessment
4	Understanding the links and connections in construction of identity	Usage
5	Apprise the students with socio-cultural concepts and historical events like Dalit literature, Bhakti Radicals and Partition literature respectively	Familiarity

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Modern Literature	• Cross-cultural Reflections in Vinay Rai's "A Rainbow of Contradictions" and "The Multitasking Indian" from *Think India*	3
2.	From other Margins (Regional environment/ecology, traditions, folklores)	• Mamang Dai's "Sorrow of Women" and "An Obscure Place" • Sanjoy Hazarika's "There are No Shangri-Las Left"	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3.	Indian Culture, tradition and societal norms	• Rajiv Malhotra's "Indian Comfort with Chaos" and "Western Joker and Indian Clown" from *Being Different: An Indian Challenge to Western Universalism*	8
4.	Views on Education, Indian ethos, identity and rural development	• S. Radhakrishnan's "The Adaptive Culture" and "Of One Mind" from *The Adaptive Indian: Identity and Ethos*	4
6.	Partition Literature: Migration and Identity	• Jhumpa Lahiri's "The Triangle", "The Second Exile" and "The Wall" from *In Other Words* • Ismat Chugtai's *Roots*	8
7.	Bhakti Radicals and Dalit Literature: Human Rights in India against caste system	• The Bhakti Radicals and Untouchability by Gail Omvedt from *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India* • Introduction to Dalit Movement; *Karukku* by Bama	3
		Total number of Lectures	42

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)

1.	Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism*. Harper Collins: Noida, 2013
2.	Radhakrishnan, S. *The Adaptive Indian: Identity and Ethos*. Orient Paperbacks: New Delhi, 2013
3.	Lahiri, Jhumpa. *In Other Words*. Penguin: New Delhi, 2017
4.	Bhagavan, Manu and Anne Feldhaus.Eds. *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India*. OUP: New Delhi, 2008.
5.	Asaduddin, M. *Ismat Chugtai: Lifting the Viel*. Modern Classics. Penguin: New Delhi, 2009

Evalution Scheme:

S.No.	Exam	Marks	Duration	Coverage/ Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire	Assignment -6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

			Semester	Group Discussions -6 Presentations -8 Class Assessment -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Understanding India: Literary Reflections)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	2	1	3	3	2	2	2	3	2.0
CO-2	1	3	3	3	3	1	1	3	2	2	1	3	2.1
CO-3	1	2	2	2	3	2	2	3	2	2	1	3	2.0
CO-4	1	3	3	3	2	3	3	3	2	3	2	3	2.5
CO-5	1	3	3	3	2	3	3	3	2	3	1	3	2.5
Average	1	2.6	2.6	2.6	2.4	2	2.4	3	2	2.4	1.4	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Database Management Systems

COURSE CODE: 18B11CI313

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Introduction to Computer Programming, Discrete Mathematics, Data Structures

Course Objectives:

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database.
3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Explain the characteristics, architecture of database approach, its components, different data models and the examples of their usage.	Familiarity
CO-2	For a given query write relational algebra expressions for that query and optimize the developed expressions.	Usage
CO-3	For a given specification of the requirement, design the databases using E-R method and normalization.	Usage
CO-4	Determine the functional dependency between two or more attributes, compute the closure of a set of attributes, evaluate a proposed decomposition	Assessment
CO-5	Give examples of the application of primary, secondary, and clustering indexes, explain the theory and application of internal and external hashing techniques.	Assessment
CO-6	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.	Assessment
CO-7	Familiarize with the security in databases and gaining familiarity with other popular databases used in the industry	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	5
2	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS -	15

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

	MYSQL, ORACLE, DB2, SQL server. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. **Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	
3	**Storage strategies:** Indices, B-trees, hashing.	6
4	**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	9
5	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	5
6	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	3
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
2. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill Ellis

Suggested Reference Book(s):

1. "Database Systems: A Practical Approach to design, Implementation and Management". Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. Bipin C Desai, ?An Introduction to Database Systems?, Galgotia. Publications Pvt Limited, 2001
3. "An Introduction to Database Systems", C.J.Date, Pearson Education.
4. "A first course in Database Systems", Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
5. "Data Management: databases and organization", Richard T. Watson, Wiley.
6. " Data Modeling Essentials", Graeme C. Simxion, Dreamtech.

Other useful resource(s):

1. Link to NPTEL course contents:
   https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL9426FE14B809CC41
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/dbms/database_normalization.htm
   b. https://www.igi-global.com/journal/journal-database-management/1072
   c. https://www.tutorialspoint.com/dbms/dbms_hashing.htm

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Database Management Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-2	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-3	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-4	3	2	3	1	2	2	2	2	1	2	1	2	1.9
CO-5	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-6	3	2	3	1	1	3	2	1	1	3	2	1	1.9
CO-7	3	3	2	1	1	3	3	1	3	3	3	1	2.3
Average	3	2.6	2.4	1.1	1.6	2.6	2.6	1.7	1.9	2.6	2	1.4	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Biological Computation

COURSE CODE:18B11BI313

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: Introduction to Bioinformatics

Course Objectives:

1. To use & develop tools to curate (compare &analyze) biological data.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Basic algorithms used in Pairwise and Multiple alignments.	Usage
CO-2	Understanding the methodologies used for database searching, and determining the accuracies of database search.	Usage
CO-3	Application of probabilistic model to determine important patterns.	Familiarity
CO-4	Prediction of structure from sequence and subsequently testing the accuracy of predicted structures.	Usage
CO-5	Determine the protein function from sequence through analyzing data.	Usage
CO-6	Analysis and development of models for better interpretation of biological data to extract knowledge.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction** Meaning of sequence, sequence similarity, homology, meaning of alignment.	1
2	**Pairwise Sequence Alignment**Different scoring models, Substitution matrices (PAM and BLOSUM), Pairwise Alignment: Concept of Global and Local Alignment, Dot matrix method, Dynamic programming (Needleman-Wunsch algorithm, Smith-Waterman algorithm, Choosing of best scoring matrix, gap penalties, Significance of score, EVD, FASTA and BLAST algorithms, Information theory and Shanon Entropy.	13
3	**Multiple Sequence alignment**Multiple Sequence Alignment methods (MSA), Scoring of a MSA, Progressive (CLUSTALW and PILEUP), Iterative (Genetic) and Hidden Markov Model (HMM) methods of MSA, Local MSA (Profile and BLOCK analysis, and Pattern searching, and Expectation Maximization (EM) Algorithm (MEME) and Gibbs Sampler.	6
4	**Structural Alignment Tools and Protein Tertiary Structure Prediction** Structure alignment algorithms & Homology modeling.	3

Approved in Academic Council held on 25.10.2018

Assistant Professor
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

5	**Markov Chains and HMM** Frequent words in DNA, Consensus word analysis, Transaction and emission matrix, Development of training set, CpG island prediction using HMM, Application of HMM in gene finding, and Multiple sequence alignment by HMM method.	7
6	**Phylogenetic Analysis** Phylogenetic tree and terminology, different methods of Phylogenetic tree prediction: maximum parsimony, distance (UPGMA, NJ), maximum likelihood methods, bootstrapping, Jacknifing and Phylogenetic analysis by using Bayesian Network.	7
7	**RNA Structure Analysis** Terminology of RNA secondary structure, inferring structure by comparative sequence analysis, RNA secondary structure prediction, Nussinov folding algorithm, energy minimization and Zuker folding algorithm.	5
Total lectures		**42**

Suggested Text Book(s):

1. D.W. Mount *Bioinformatics: Genome and Sequence Analysis*:(2001) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
2. Ian Korf, Mark &Josaph: *BLAST*, Oreilly Publisher, 2003
3. R. Durbin, S. Eddy, A. Krogh and G. Mitchison, *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids.* Cambridge University Press.
4. A.D. Baxevanis& B.F.F. Oulette *Bioinformatics – A practical guide to the Analysis of Genes and Proteins*,2002, Willey International publishers.
5. M.J. Bishop and C.J. Rawlings (editors), *DNA and Protein Sequence Analysis--A Practical Approach* IRL Press at Oxford University Press, ISBN 0 19 963464 7 (Pbk)
6. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York

Suggested Reference Book(s):

6. J. Setubal and J. Meidanis(1997) *Introduction to Computational Molecular Biology,* PWS Publishing Co.
7. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc19_bt01/preview

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Biological Computation)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-2	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-3	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-4	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-5	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-6	3	3	3	3	3	1	1	-	1	1	1	3	1.9
Average	3	3	3	3	3	1	1	-	1	1	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Database Management Systems

COURSE CODE: 18B11CI313

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Introduction to Computer Programming, Discrete Mathematics, Data Structures

Course Objectives:

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database.
3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Explain the characteristics, architecture of database approach, its components, different data models and the examples of their usage.	Familiarity
CO-2	For a given query write relational algebra expressions for that query and optimize the developed expressions.	Usage
CO-3	For a given specification of the requirement, design the databases using E-R method and normalization.	Usage
CO-4	Determine the functional dependency between two or more attributes, compute the closure of a set of attributes, evaluate a proposed decomposition	Assessment
CO-5	Give examples of the application of primary, secondary, and clustering indexes, explain the theory and application of internal and external hashing techniques.	Assessment
CO-6	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.	Assessment
CO-7	Familiarize with the security in databases and gaining familiarity with other popular databases used in the industry	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	5
2	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS -	15

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	MYSQL, ORACLE, DB2, SQL server. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. **Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	
3	**Storage strategies:** Indices, B-trees, hashing.	6
4	**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	9
5	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	5
6	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	3
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
2. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill Ellis

Suggested Reference Book(s):

1. "Database Systems: A Practical Approach to design, Implementation and Management". Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. Bipin C Desai, ?An Introduction to Database Systems?, Galgotia. Publications Pvt Limited, 2001
3. "An Introduction to Database Systems", C.J.Date, Pearson Education.
4. "A first course in Database Systems", Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
5. "Data Management: databases and organization", Richard T. Watson, Wiley.
6. " Data Modeling Essentials", Graeme C. Simxion, Dreamtech.

Other useful resource(s):

1. Link to NPTEL course contents:
   https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL9426FE14B809CC41
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/dbms/database_normalization.htm
   b. https://www.igi-global.com/journal/journal-database-management/1072
   c. https://www.tutorialspoint.com/dbms/dbms_hashing.htm

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Database Management Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-2	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-3	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-4	3	2	3	1	2	2	2	2	1	2	1	2	1.9
CO-5	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-6	3	2	3	1	1	3	2	1	1	3	2	1	1.9
CO-7	3	3	2	1	1	3	3	1	3	3	3	1	2.3
Average	3	2.6	2.4	1.1	1.6	2.6	2.6	1.7	1.9	2.6	2	1.4	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Introduction to Bioinformatics

COURSE CODE:18B11BT413

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P: 3-1-0

Pre-requisite: Molecular Biology, Biochemistry

Course Objectives:

1. Background and need for bioinformatics
2. Learn sequence analysis techniques.
3. Learn sequence alignment-pairwise and multiple.
4. Apply phylogenetic analysis.
5. Application of bioinformatics in modern day research.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Knowledge of bioinformatics databases and resources	Familiarity
CO-2	Sequence analysis including pairwise sequence alignment	Assessment
CO-3	Sequence analysis using multiple sequence alignment	Assessment
CO-4	Sequence annotation by identifying motifs, domains, conserved regions, predicting secondary structure of protein sequences	Usage
CO-5	Perform phylogenetic analysis of protein sequences and RNA secondary structure prediction	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Bioinformatics and its role in modern biology, Current scenario of Bioinformatics in India	3
2	**Databases:** Biological databases: classification into different types; sequence retrieval and sequence submission PubMED Nucleic acid sequence database (NCBI, EMBL, DDBJ) Genome database (TIGR) Protein sequence database (SWISSPROT) Databases of metabolic pathways (KEGG) ENTREZ, sequence retrieval system (SRS), Protein identification resource (PIR), Expert Protein Analysis System (ExPASY), Ensembl, sequence formats, Seqin, BankIt	8
3	**Sequence Alignment:** Sequence Alignment: Dot plots, Alignments (Needleman & Wunsch algorithm, Smith-Waterman algorithm-with simple scoring systems), Multiple sequence alignment, Amino acid distance measures (PAM matrices, Blosum matrices)	8
4	**DatabasesearchDatabasesearching** : FASTA, BLAST	8
5	**Fundamental of sequence alignment:** Sequence similarity: Basic concepts, similarity scores	7
6	**Primer design:** Principles, Programs for Primer Design	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

7	**Distance measures:** Nucleotide distance measures (simple counts method, Jukes-Cantor correction, Kimura 2 parameter correction);	4
8	**Phylogenetic reconstruction:** Introduction, distance method (UPGMA, NJ), parsimony method	7
9	**Gene prediction:** Principles and programs for Gene prediction.	2
10	**Molecular modelling:** Homology modeling, docking, energy field calculations, molecular dynamics	2
11	**Protein sequence analysis:** Primary sequence analysis, protein structure visualization and Secondary structure prediction	7
12	**RNA secondary structure prediction:** Principles and programs for RNA secondary structure prediction	3
	Total lectures	42

Suggested Text Book(s):

a. Bioinformatics: D.W. Mount
b. Introduction to Bioinformatics by Arthur Lesk
c. Bioinformatics: Databases, tools and Algorithms by OrpitaBosu and Simminder Kaur Thukral
d. Knowledge discovery in Bioinformatics: Xiaouha Hu, Yi Pan

Suggested Reference (s):

e. Sousa et al., Bioinformatics Applications in Life Sciences and Technologies, 2016. PubMed PMID: PMC4870335

Other useful resource(s):

i. https://www.hindawi.com/journals/isrn/2013/615630/
ii. https://www.sciencedirect.com/science/article/pii/S0888754317300551

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Introduction-to-BI)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	1.92
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	1.75
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	1.73
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	1.73
CO-5	2	2	2	2	2	1	1	1	-	-	-	2	1.67
Average	2.0	2.0	2.0	2.0	2.0	1.25	1.25	1.4	2.0	2.0	1.33	2.0	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Design and Analysis of Algorithms

COURSE CODE: 18B11CI412

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Data structure and algorithms

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.	Technical
CO-2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.	Technical
CO-3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.	Technical
CO-4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.	Technical
CO-5	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.	Technical
CO-6	Explain the ways to analyze randomized algorithms (expected running time, probability of error).	Technical
CO-7	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).	Technical

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior Performance measurements of Algorithm, Time and space trade-offs, Analysis o recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters" theorem. Examples: Binary counter, Recursive Fibonacci in LogN	10
2	Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	of Algorithms; Illustrations of these techniques for Problem- Solving , Bin Packing, Knap Sack TSP. Heuristics characteristics and their application domains. Examples: Greedy and dynamic scheduling, Hoffman encoding, Dynamic programming: Longest common subsequence, Matrix chain multiplication Dynamic programming: Bin packing, Knapsack, Dynamic programming: TSP, Branch and Bound TSP, Backtracking: SAT, Maze Sudoku solver, 8 queen	
3	Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Examples: Best first search, Binomial heap MST: Prims, Kruskal, Fibonacci heap MST: Tarjan, Lazy decrease key implementation and Dijkstra, MaxFlow/ MinCut Ford-Fulkersion	8
4	Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook"s theorem, Standard NP-complete problems and Reduction techniques. Examples: Set Cover, Vertex cover, Map coloring, chromatic number	8
5	Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems, beyond NP – P SPACE, Examples: Approximate matrix inversion, Randomized Eigen vector computation	8
Total lectures		**42**

Suggested Text Book(s):

1. Rntroduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.

Suggested Reference Book(s):

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition,
3. Michael T Goodrich and Roberto Tamassia, Wiley.
4. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs20/preview
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106101060/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course outcomes (Design and Analysis of Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	1	1	3	3	3	1	3	2.5
CO-2	2	2	2	2	2	1	1	1	2		1	2	1.6
CO-3	3	3	3	3	3	1	1	1	3	1	1	3	2.2
CO-4	2	2	2	2	2	2	1	1	2		2	2	1.8
CO-5	2	2	2	2	2	3	1	1	2	2	2	2	1.9
CO-6	2	2	2	2	2	2	1	2	2	2	2	2	1.9
CO-7	2	2	2	2	2	2	1	2	2	2	2	2	1.9
Average	2.3	2.3	2.3	2.3	2.3	1.7	1	1.6	2.3	2	1.6	2.3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Structure and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisites: C/C++

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures
5. Introduce students to data abstraction and fundamental data structures.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

Course Contents:

Unit	Contents	Lectures required

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

1	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off Searching: Linear Search and Binary Search Techniques and their complexity analysis.	7
2	**Stacks:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	5
3	**Queues:** ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	5
4	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	8
5	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	6
6	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	6
7	**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	5
Total lectures		42

Suggested Text Book(s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.
3. "Data structures and Algorithms Made Easy" 5th edition by Narasimha Karumanchi, Career monk publications
4. "Data Structure and Algorithms in C" 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106102064/
2. Link to topics related to course:
   a. https://onlinecourses.nptel.ac.in/noc18_cs25/preview
   b. https://nptel.ac.in/courses/106103069/

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

c. http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:
   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * SOLAN
IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	2.4
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	2.3
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	2.5
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	2.4
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	2.7
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	2.6
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	2.5
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Mining

COURSE CODE: 10B22CI622

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objective:

1. To describe the concept of Data warehouse & its attributes
2. To study different data warehouse models, architectures and implementation
3. To understand the basic concept of data mining and its functionality
4. To understand the concept of classification techniques and its implementation
5. To understand the concept of association rules, different techniques and implementation details
6. To understand the concept of cluster analysis, anomaly detection and its usage and implementation details

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To describe the concept of Data warehouse & its attributes	Assessment
CO-2	To study different data warehouse models, architectures and implementation	Assessment
CO-3	To understand the basic concept of data mining and its functionality	Assessment
CO-4	To understand the concept of classification techniques and its implementation	Assessment
CO-5	To understand the concept of association rules, different techniques and implementation details	Assessment
CO-6	To understand the concept of cluster analysis, anomaly detection and its usage and implementation details	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concepts of Data Warehouse and Data Mining including its functionalities, stages of Knowledge discovery in database(KDD) , Setting up a KDD environment, Issues in Data Warehouse and Data Mining, Application of Data Warehouse and Data Mining	5
2	**Architecture:** DBMS vs. Data Warehouse, Data marts, Metadata, Multidimensional data model, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations, Data Warehouse Architecture, Distributed and Virtual Data Warehouse, Data Warehouse Manager, OLTP, OLAP, MOLAP, HOLAP, types of OLAP, servers	6
3	**Introduction:** Data Mining, Motivation, Challenges, Origins of Data Mining, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity, Exploring Data: Iris Data Set, Summary Statistics,	3

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Visualization, OLAP and Multi dimensional Data Analysis	
4	**Classification:** Basic Concepts and Preliminaries, Approach to Solving a Classification Problem, Decision Tree Induction, Model Over fitting, Evaluating Performance of Classifier **Alternative Techniques**: Rule-Based Classifier, Nearest- Neighbour Classifiers, Artificial Neural Network (ANN), Support Vector Machine (SVM), Ensemble Methods, Class Imbalance Problem, Multiclass Problem	6
5	**Association Analysis:** Basic Concepts and Problem Definition, Frequent Itemset Generation, Rule Generation, Representation of Frequent Itemsets, FP-Growth Algorithm, Evaluation of Association Patterns, Handling Categorical Attributes , Handling Continuous Attributes, Handling a Concept Hierarchy, Sequential Patterns, Subgraph Patterns	6
6	**Cluster Analysis:** Basic Concepts, Characteristics of Data, Clusters, Partitional Clustering, Agglomerative Hierarchical Clustering, Prototype-Based Clustering, Density-Based Clustering, Graph-Based Clustering, Cluster Evaluation **Anomaly Detection:** Preliminaries, Statistical Approaches, Proximity-Based Outlier Detection, Density-Based Outlier Detection, Clustering-Based Techniques	6
Total lectures		**32**

Suggested Text Book(s):

1. Data Mining Concepts and Techniques J. Han and M. Kamber Morgan Kaufmann, 2006, ISBN 1-55860-901-6
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7

Suggested Reference Book(s):

1. Mining Massive data sets Anand Rajaram, Jure Leskovec and Jeff Ullman Cambridge University Press
2. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
3. https://www.coursera.org/specializations/data-mining.
4. https://www.futurelearn.com/courses/data-mining-with-weka

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	1.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO 2	3	3	3	3	3	3	2	3	3	1	1	3	2.6
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	2.5
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	1.7
CO 5	3	3	3	3	2	3	1	2	3	2	3	3	2.6
CO 6	3	2	1	2	2	1	2	2	2	1	1	2	1.8
Average	3	2.3	2.2	2.3	2.2	2	1.5	2.2	2.3	1.5	1.8	2.5	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:

   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements

2. Link to topics related to course:

   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	2.4
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	2.3
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	2.5
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	2.4
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	2.7
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	2.6
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	2.5
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Programming Languages for Bioinformatics

COURSE CODE:18B11BI414

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P : 3-0-0

Pre-requisite: None

Course Objectives:

1. To familiarize and master the programming skills in Perl and Python.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Write and execute a script in Perl.	Usage
CO-2	Enable routine and module calls and their implementation using Bioperl.	Familiarity
CO-3	Able to formulate stepwise implementation of a Perl script (from developing a pseudo-code to execute a successful bug-free code) for a given problem in Bioinformatics.	Usage
CO-4	Write and execute a script in Python.	Usage
CO-5	Enable routine and module calls and their implementation using Biopython.	Familiarity
CO-6	Able to formulate stepwise implementation of a Python script (from developing a pseudo-code to execute a successful bug-free code) for a given problem in Bioinformatics.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Crash course in C	2
2	Programming basics	1
3	Sequences and Strings: Storing a DNA sequence, Concatenation, Transcription, Translation	2
4	Arrays and Scalar list, Strings to Array, Operations on Strings	2
5	Subroutines and Command line arguments	3
6	Modules, Calling modules	2
7	Hashes, Data Structures in Perl	4
8	Reading files and writing output formats	3
9	Regular expressions and Perl Operations	3
10	Parsing genbank, PDB, BLAST, and other file formats	3
11	Object-oriented programming, Complex Data Structures, Relational Databases	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

12	BioPerl	3
13	Introduction to Python	3
14	BioPython	4
15	Applications of Python and BioPython	3
Total lectures		**42**

Suggested Text Book(s):

a. Beginning Perl for Bioinformatics By James Tisdall, O'Reilly Media (2001)
b. Mastering Perl for Bioinformatics By James Tisdall, O'Reilly Media (2003)
c. Python For Bioinformatics By Sebastian Bassi, Chapman and Hall (2010)

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Bio-resources and Industrial Product (*Core Course*14B1WBT 741)

(B.tech, Sem VIII) **Credits 3**

Lectures 3 Tutorial 0 Practical 0

Pre-requisites: Biochemistry, fundamental biology, chemistry

Course Objectives (Learning Goal):

The use of natural, renewable and/or bio-resources is becoming more and more important to for sustainable growth along with enormous challenges at economic, environmental level. The Objectives of the course are

1. To make the student understand the value of bio-resources
2. Introduction to bio-renewable products, processes and their related industrial sectors viz. Medicine, Food , agriculture , bio-chemicals, bio-composites, bio-energy & biofuel, and forest products.

Course Assessment:

Test 1	15
Test 2	25
Test 2	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

At the end of the course students will have a fundamental understanding of the natural bioresearches and able to

Co-PI: Define "bioproduct" to reflect the scope and focus of opportunities to understand environmentally sustainable science-based processes of conversion of living organism-based resources into manufactured goods

Co-PII:. Develop a workable concept of bio-resource utilization with respect to broad economic feasibility, considerations of bio-resource availability, conversion (technologies) and receptor industries (markets).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course Outline

S.N.	Topic		Lecture
1	Overview	• Resources (Renewable & Non-renewable) • Bio-resources • Bio-resources Engineering • Different Scale of Bio-resource Engineering	4
	Raw Material Resource	• Microbial Bio-resources • Plant Bio-resources • Animal Bio-Resources	6
2	Industrial Products	• Novel Plant Bioresources: • Medicine • Food • Cosmetics	12
3	Industrial Products	• Animal Bioresources: • Medicine • Food • Cosmetics	5
4	Industrial Products	• Microbial Bioresources: • Medicine • Food • Cosmetics	6
5	Processing Technology	• Biorefinery Concept • Processes for converting Raw material to biobased product • Novel Development in Procesing Technology	6
6	Case Study	• Case study of lignocellolose-Ethanol Processing	2

Methodology

The course will be taught through lectures. Apart from the discussions on the topics covered in the lectures, presentations, assignments in the form of questionnaires will also be given.

Internal Assessment

Assessment	Marks
Quiz/presentations	15
Assignment	5
Attendance	5
TOTAL	**25**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Books and references

Text Books:

- ✓ Renewable Bioresources: Scope and Modification for Non-food Applications Editors CHRISTIAN V. STEVENS
- ✓ Biotechnology for Agro-Industrial Residues Utilisation Poonam Singh nee' Nigam · Ashok Pandey
- ✓ Emerging Bioresources with Nutraceutical and Pharmaceutical Prospects: Seema Patel
  San Diego State University, San Diego, California, USA, Springer
- ✓ Dairy Chemistry and Biochemistry P.F. FOX and P.L.H. McSWEENEY Department of Food Chemistry University College, Cork Ireland

Reference Books and material

- ✓ Review articles on relevant topics from diverse sources
- ✓ *BioResources* (ISSN: 1930-2126): a peer-reviewed online journal devoted to the
- ✓ science and engineering of lignocellulosic materials, chemicals, and their applications for new uses and new capabilities

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Advanced Concrete Technology

COURSE CODE: 10B13CE744

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Concrete Technology

Course Objectives:

1. To prepare the graduates as best civil engineers with an excellent comprehension of fundamentals of concrete structure at micro and macro levels and applications of different types of cement and concretes.
2. To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.
3. Study and understand the procedure of mix design for production of ultra-high strength concrete by the use of particle packing concepts.
4. To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete
5. To understand the fundamentals of self-compacting concrete and its testing for different properties.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To study the basic fundamentals, classifications and applications of polymer concrete, fiber reinforced concrete.	Familiarity
CO-2	To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.	Assessment
CO-3	Study and Understand the procedure of mix design for production of ultra high strength concrete by the use of particle packing concepts.	Assessment
CO-4	To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete.	Usage
CO-5	To understand the basic fundamentals of self compacting concrete and its testing for different properties.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction to polymer concrete- its classification and applications.	14
2	**Ultra high strength concrete:** basic fundamentals. Types, application and production.	4
3	**Mix design of Polymer concrete and UHPC:** Introduction of particle packing concept, optimization of granular mixture and how to design for a mixture to increase the homogeneity of the mixture.	8
4	**Self compacting concrete:** Mix design, testing, production and application.	4
5	**Mineral and chemical admixtures**: Optimization and selection of a particular type of mineral and chemical admixture.	12
Total lectures		42

Suggested Text Book(s):

1. A.M.Neville, -Properties of Concretel, English Language Book Society/Longman Pub, 1988
2. P.K.Mehta and J.M.M.Paulo, —Concrete – Microstructure – Properties and Materiall, ICI, Indian First Edition, Reprint1999.

Suggested Reference Book(s):

1. Zonghjin Li, —Advanced Concrete Technology, John Wiley & Sons, INC, Newjersy,20111.
2. A.R. Santhakumar, —Concrete Technologyl, Oxford University press, New Delhi,2009.
3. N.Krishna Raju, —Design of Concrete Mixl, CBS Pub.,1985.
4. Taylor, H. W. F., _Cement Chemistry,' Academic Press, Inc., San Diego, CA,1990.
5. Lea, F. M., _The Chemistry of Cement and Concrete,' Chemical Publishing Company, Inc., New York, 1971.
6. Mindess, S., and Young, J. F., _Concrete,' Prentice Hall, Inc., NJ, 1981. J. Newman and B. S. Choo,Eds., _Advanced Concrete Technology', Four Volume Set, Elsevier, 2003

Other useful resource(s):

1. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_ce21/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Advanced Concrete Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	2	1	1	3	1	1	2	2	3	3	**1.92**
CO-2	1	2	3	2	2	1	2	3	3	1	3	2	**2.08**
CO-3	3	3	3	2	1	1	2	3	2	2	3	2	**2.25**
CO-4	3	2	1	3	1	2	3	3	2	3	3	2	**2.33**
CO-5	2	3	3	3	1	3	1	2	2	3	3	2	**2.33**
Average	**2.4**	**2.2**	**2.4**	**2.2**	**1.2**	**2**	**1.8**	**2.4**	**2.2**	**2.2**	**3**	**2.2**	

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Java Programming

COURSE CODE: 18B1WCI534

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Object-Oriented Systems and Programming

Course Objectives:

1. Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications
4. Designing distributed applications using Remote Method Invocation (RMI)

Course Outcomes:

S. No	Course Outcomes	Level of Attainment
CO-1	To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings	Usage
CO-2	To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.	Usage
CO-3	To learn the server side programming using Servlets and JSP.	Usage
CO-4	To learn the invocation of the remote methods in an application using RMI	Usage

Course Contents:

Unit	Contents	Lectures required
1	Applet Programming: Structure and Life Cycle of a Java Applet, Graphics, Multithreading and Animation, Abstract Windowing Toolkit, Swings and Event Handling.	8
2	Java Database Connectivity (JDBC): JDBC Product, Types of Drivers, Two- Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface.	6
3	Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP. Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page, JSP with Java Bean.	10
4	Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application.	4
	Total Lectures	28

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2. Advanced Java Programming by Uttam K. Roy, Publisher: Oxford University Press

Suggested Reference Book(s):

1. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media

Other useful resource(s):

1 Link to NPTEL course contents:

i. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

ii. https://nptel.ac.in/courses/106105084/28

2 Link to topics related to course:

i. https://www.javatpoint.com/

ii. https://www.tutorialspoint.com/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Java Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	1	2	2	3	1	3	1	3	2.2
CO-2	3	3	2	2	1	2	1	3	2	2	3	3	2.3
CO-3	3	3	2	3	3	3	1	3	2	3	3	2	2.6
CO-4	3	3	2	3	3	3	1	3	2	3	3	2	2.6
Average	3	3	2	2.5	2	2.5	1.3	3	1.8	2.8	2.5	2.5	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Air and Noise Pollution and Control

COURSE CODE: 10B13CE742

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn history of air pollution, definition of air pollution, and source and classification of air pollution.
2. Learn the effects of air pollutants on human health, vegetation and materials and major control devices to control air pollution problems.
3. Learn dispersion phenomenon of air pollutants covering diffusion and advection, meteorological components, stability of atmosphere and corresponding plume shapes.
4. Learn an overview of noise pollution including methods for prevention, control, measures and management of the pollution.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn the air pollution issues and characterize the elements of air pollution.	Familiarity
CO-2	Solve and design complex problems related to dispersion and air quality modeling.	Assessment
CO-3	Apply relevant techniques and methods for control, and prevention of air pollution	Assessment
CO-4	Develop an overview understanding of the strategies, regulations and policies to manage air and noise pollution.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** The earth's atmosphere: structure and composition.	3
2	**Definition and Elements:** Air pollution: definitions: types of pollutants, sources; effect of air pollution on health, environment and materials; air pollution episodes.	5
3	**Meteorology:** Air pollution meteorology: atmospheric circulation patterns, atmospheric stability and vertical mixing, lapse rate and	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	temperature inversions.	
4	**Dispersion Modelling:** Atmospheric dispersions modelling: atmospheric stability classes, Gaussian model, estimation of downwind concentrations, plume rise, tall stacks, and critical wind speed.	8
5	**Control of Particulate Matters:** Control of particulate Matter: characteristics of particles drag force, impaction, interception and diffusion. Cyclones, Electrostatic precipitators, Fabric filter, Particulate scrubbers, spray-chambers, cyclone spray chambers, orifice and wet-impingement scrubbers, venturi and venture-jet scrubbers.	6
6	**Control of Gaseous Emissions:** Control of gaseous emissions: gas-liquid and gas solid equilibrium, solubility, absorption, and kinetics. Gas absorption: physical and chemical absorption, isotherms, and absorption potentials.	6
7	**Legislation and Regulations:** Air Pollution Control Act, National Environmental Policy Act, Ambient Air Quality Standards.	4
8	**Noise Pollution:** Noise pollution definition, prevention and control measures, management of pollution.	4
Total lectures		42

Suggested Text Book(s):

1. H.S. Peavy, D.R. Row and G. Tchobanoglous, Environmental Engineering, Mc Graw Hill International Edition.
2. Air Pollution, M. N. Rao and H.V.N. Rao, Tata Mc Graw Hill.
3. Wark, K., & Warner, C. F. (1981). Air pollution: its origin and control.

Suggested Reference Book(s):

1. Atmospheric Pollution: History, Science, and Regulation, by Mark Z. Jacobson, Cambridge University Press, Cambridge, 2002.
2. Air Quality, by Thad Godish, 4th Edition, Lewis Publishers, 2003.
3. Atmospheric Chemistry and Physics, by John Seinfeld and Spyros Pandis, John Wiley & Sons, 1997.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105102089/
2. Link to topics related tocourse:https://nptel.ac.in/courses/105104099/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Air and Noise Pollution and Control)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	1	1	1	1	1	2	x	x	x	2	**1.33**
CO-2	2	3	3	3	3	2	x	1	2	1	x	1	**2.1**
CO-3	2	3	3	3	3	2	2	1	2	1	x	1	**2.1**
CO-4	2	1	1	2	1	1	2	2	2	1	1	2	**1.5**
Average	**2**	**2**	**2**	**2.25**	**2**	**1.5**	**1.67**	**1.5**	**2**	**1**	**1**	**1.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Antibody Engineering Technologies

14B1WBT736 **Elective**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Immunology

Course Objectives/Learning Goals:

1. The objective of the course is to offer students insight into the understanding of monoclonal antibody engineering for practical use in medicine and biotechnology.

Course Assessment:

Test - 1	15
Test - 2	25
Test - 3	35
Teacher Assessment (Based on Assignments, Quizzes etc.)	25
Total	100

Course Outcomes:

CO I: The students would have in-depth knowledge of generation of mouse, chimeric, humanized and human monoclonal antibodies and their screening strategies.

CO II: The students would have sound knowledge modification of existing human proteins and antibodies and their therapeutic and diagnostic applications.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topics covered:

Topic	No. of Lectures
Antibody Structure and Function: Basic structure and fine structure of Ig's including domain structure of antibody, immunoglobin classes and subclass. Immunogenicity, affinity, stability, effector functions, half-life, and tissue penetration and distribution. Genetic Rearrangement of IgSF.	7
Traditional methods for Antibody Productions: Monoclonal antibodies, Hybridoma Technology, Applications of Monoclonal antibodies in therapy and diagnosis, drawbacks and limitations of Monoclonal antibodies.	5
Murine, Chimeric, Humanized and Human Antibodies: Approaches for construction and generation of chimeric and humanized antibody, HAMA and HACA, Generation of fully human monoclonal antibodies – methods and procedures.	4
Selecting and screening recombinant antibody libraries: Recombinant antibody libraries, Expression of antibody in bacteria, Phage display technology for screening antibody libraries, screening and generation of transgenic mice for antibody production.	6
Antibody libraries - Immune Library, Naive library, Synthetic library, Semisynthetic library, high throughput screening of libraries.	3
Regulatory issues for the development of antibody, Patents related to antibodies.	1
Engineered Antibodies for therapy and diagnosis: Antibody fragments, immuno, prodrug and toxin conjugates of antibodies, Antibodies against tumors, cancers and other diseases, prospects and challenges for immuno-conjugates.	8
FDA approved Recombinant antibodies in the clinic: Orthoclone, Rituxan, Zenapax, Humira, CDP571, IDEC-CE9.1. etc	8
Total	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Text books

1. Fathimunisa Begum, "*Monoclonal Antibodies: the hopeful drugs*", Chennai: MJP Publishers, 2008.

Reference books

1. John McCafferty, H. R. Hoogenboom, D. J. Chiswell, "*Antibody Engineering: a practical approach*", Oxford University Press, New Delhi, 2002.
2. Lo, Benny K. C, "*Antibody Engineering: methods and protocols*", Totowa: Humana Press, 2004. ***(e-book)***
3. William J. Harris, John R Adair, "*Antibody Therapeutics*", New York: CRC Press, 1997.
4. Steven J Shire, Wayne Gombotz, James Andya, "*Current Trends in Monoclonal Antibody Development and Manufacturing*", New York: Springer Verlag, Netherlands, 2010.
5. Nature Biotechnology: Volume 23 Number 9 September, 2005.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE OUTLINE

13B1WCI731 ARM based Embedded System Design

July- Dec 2017

Instructor:

Associate Prof. Dr. Vivek Kumar Sehgal

Description:

ARM designs the world's most popular processor architecture for embedded systems. The technology can be found at the heart of advanced digital products, from wireless, networking and consumer entertainment solutions to imaging, automotive, security and storage devices. This course is designed to provide the necessary knowledge to develop software for an ARM based system targeted in embedded software development. Topics cover the software aspects of ARM system which including assembly and C language programming and an introduction to the control and interfacing of embedded systems. Upon completion, students will understand the ARM architecture development, and will be familiar with supporting hardware and embedded system development process.

Goals of the Course:

1. Describe the architecture of a typical embedded RISC processor (e.g. ARM Cortex-M3)
2. Develop an understanding of the instruction set and addressing modes
3. Write programs that exercise a range of typical microcontroller peripherals (e.g. GPIO, USART, ADC, etc...)
4. Use a typical toolchain to implement and test simple embedded microcontroller applications in C and assembly language
5. Evaluate the requirements for embedded Real Time Operating Systems (RTOS)
6. Understand the structure of a RTOS (e.g. eLinux)

Textbook

Steve Furber, "ARM System-on-Chip Architecture", 2nd Edition, Addison Wesley Professional 2000

Detailed course notes and slides written by the lecturer will be served as the examinable materials for the course. All required course materials are available from the institute's WebCT Web site.

References

David Seal, "ARM Architecture Reference Manual", 2nd Edition, Addison Wesley Professional, 2000

Andrew Sloss, et al, "ARM System Developer's Guide: Designing and Optimizing System Software", 1st Edition, Morgan Kaufmann, 2004

1. Ability to use a computer to prepare written reports and to perform basic data reduction, graphing, and engineering data presentation.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Topics:

Week	Topics to be covered
1	Computer Architecture Introduction
2	ARM Software Development Tools and ARM Architecture Fundamentals
3	ARM Instruction Set Architecture and Addressing Mode
4	ARM Assembly Language Programming Basics
5	More on ARM Assembly Language Programming
6	The Thumb Instruction Set
7	Exception and Interrupt Handling
8	Programming Techniques for ARM
9	
10	ARM Processor Architecture
11	C Startup Sequence and ARM Based Hardware Consideration
12	Introduction to Debug Tools for ARM Based Systems
13	ARM Test Revision
14	ARM on virtual mchine
15	ARM Exam Revision

Resources:

1. ARM Architecture Reference Manual (local copy)
   ARM7TDMI Technical Reference Manual (local copy)
   ARM7TDMI Instruction Set Reference (local copy)
2. ARM7TDMI Quick Reference (local copy)
3. An Introduction to the GNU Assembler
4. An Introduction to the GNU Compiler
5. An Introduction to GNU Debugger
6. ARMv4T Partial Instruction Set Summary
   Pete Cockerell has put the text of his 1987 book "ARM Assembly Language Programming" on the web (local copy)
7. A book by Peter Knaggs and Stephen Welsh, ARM: Assembly Language Programming @2004 - download for free (local copy)
8. ARM System-On-Chip Architecture (2nd Edition) by Steve Furber (the father of the ARM processor) - download for free (local copy)

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Assignments, Quizzes, and Attendance	25	Entire Semester	Assignment (3) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Objectives:

CO-1	Computer Architecture Introduction
CO-2	ARM Software Development Tools and ARM Architecture Fundamentals
CO-3	ARM Instruction Set Architecture and Addressing Mode
CO-4	ARM Assembly Language Programming Basics
CO-5	More on ARM Assembly Language Programming
CO-6	The Thumb Instruction Set
CO-7	Exception and Interrupt Handling
CO-8	Programming Techniques for ARM
CO-9	ARM Processor Architecture

S No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	H	H	H	H	M	M	H	H	M	H	H	H	92%
CO-2	H	H	H	M	L	L	M	H	M	H	H	H	81%
CO-3	H	H	M	M	M	L	M	M	M	H	H	H	78%
CO-4	H	H	H	M	M	L	M	H	M	H	H	H	83%
CO-5	H	H	H	H	M	L	M	H	M	L	H	H	81%
CO-6	H	H	H	H	M	L	M	H	M	M	H	H	83%
CO-7	H	H	M	M	M	H	H	M	M	H	H	H	86%
CO-8	H	H	H	H	H	M	H	H	M	L	H	L	83%
CO-9	H	H	H	H	M	H	H	H	M	M	H	L	86%
	100%	100%	93%	85%	67%	56%	81%	93%	67%	78%	100%	85%	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Artificial Intelligence

COURSE CODE: 18B1WCI742

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structure, Discrete Structure

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction:** Intelligence, Definitions of Intelligent Agents **Single-Agent Search:** Breadth-first, Depth-first and Iterative Deepening Search, Heuristic Search (A* search), Stochastic Local Search (Simulated Annealing, Genetic algorithms)	7
2	**Adversarial Search:** Minimax Search, Alpha-beta pruning, Stochastic Games and Expectiminimax **Knowledge Representation and Logic:** Propositional Logic, Propositional Inference , First-Order Logic, Propositional Inference (Forward chaining, Backward chaining)	7
3	**Reasoning Under Uncertainty:** Probability Bayes Rule , Bayesian Networks, Bayesian Inference	7
4	**Machine Learning**: Definition and examples of broad variety of machine learning tasks, including classification, Inductive learning, Simple statistical-based learning, such as Naive Bayesian Classifier, decision trees, The over-fitting problem, Measuring classifier accuracy	11
Total lectures		32

Suggested Text Book(s):

1. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
2. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Machine Learning by Tom M. Mitchell
3. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb

Other useful resource(s):

1. Link to NPTEL course contents:
   i. https://nptel.ac.in/courses/106105077/
   ii. https://nptel.ac.in/courses/106105079/
2. Link to topics related to course:
   i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   ii. https://ai.google/education/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Artificial Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	2	1	2	1	2	2	2	1.9
CO-2	3	3	3	1	3	2	1	2	1	2	3	2	2.2
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Weightage	3	3	3	2.2	2	1.4	1.6	2	1.6	2	2.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

	Bioenergy and Biofuels	
14B1WBT731		**Elective Course**
		Credits: 3
		L 3 T 0 P 0

Pre-requisites: None

Course Objectives (Learning Goal):

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economical issues related to first, second and third generation biofuels along with Physico chemical techniques

.

Course Assessment:

T1	15
T2	25
T3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes: After the course the students will be able to

CO I: Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels

CO II: Technical barriers in Bioenergy and Biofuel Technology

CO III: Whole biorefinery approaches for economical implementation into the market.

CO IV: Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT • H.P. IQAC

Topics covered:

Introduction to Biofuels and Bioenergy: Definition, Global Energy Outlook, Sustainability, **Biomass** Feedstocks, Processes and Technologies, Environment and Ecology

Crop Oils, Biodiesel, and Algae Fuels; Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel

Ethanol from Corn and Lignocellulosics: Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-to-Ethanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction

Fast Pyrolysis and Gasification of Biomass: Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas

Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock: Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock

Text Books:

Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press

Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers .

Reference material

Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels	H	H	H	H	H	H	H	100
CO-II	Technical barriers in Bioenergy and Biofuel Technology	H	H	H	M	H	H	M	90.47
CO-III	Whole biorefinery approaches for economical implementation into the market	H	H	H	H	H	H	M	95.23
CO-IV	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy	H	H	H	H	H	H	H	100
	Assessment (%)	100	100	100	91.66	100	100	83.33	

1. Low
2. Medium
3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Biosensors-Principles and Applications

Course Code: XXXXXXX
Course Credits: 3
Elective
L-T-P: 3-0-0

Pre-Requisite: Fundamental Physics and Chemistry and Advance Biology

Course Objectives

1. This course introduces the students to the highly interdisciplinary field of biosensors.
2. Learn the fundamental concept of biosensors, design and fabrication.
3. Learn different type of biosensor and their applications in healthcare or agriculture

Course Outcomes

CO I	Able to understand the fundamentals of biosensors: Types, characteristics, operating condition and applications.	Familiarity
CO II	To develop a fundamental concept of molecular reorganization for biosensor development.	Assessment
CO III	Able to understand the basics principle related with bioinstrumentation and electrochemical sensor fabrication.	Assessment& Technical
CO IV	Able to understand the basics principle related with bioinstrumentation and optical and nanosensor fabrication.	Assessment& Technical
CO V	Fundamental understanding of sensor application in medicine, health, agriculture, environment and food science.	Usage

Course Content:

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Introduction**	Overview of biosensor and applications: medicine, agriculture, bio-production, and environment, Desired characteristics of biosensors: reliability, simplicity, cost, and related parameters, Application notes: operating conditions, calibration, positive and negative controls, safety.	6
2	**Biosensors and electrochemistry**	Molecular reorganization: Enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity, Fundamentals of surfaces and interfaces.	7
3	**Bioinstrumentation and bioelectronics devices**	Principles of Potentiometry and potentiometric biosensors, Principles of amperometry and amperometric biosensors, Electrochemical Sensors Optical Biosensors based on Fiber optics and nanomaterial. Principle of fluorescence biosensor, SPR biosensor. Introduction to electronic nose and electronic tongue. Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology	14
4	**Application And uses of Biosensors**	Biosensors in clinical chemistry, medicine and health care, biosensors for veterinary, agriculture and food Low cost - biosensor for industrial processes for online monitoring; biosensors for environmental monitoring. Application of enzymes in analysis; design of enzyme	12

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

		electrodes and their application as biosensors in industry, healthcare, food and environment. Basics of In- Vivo Biosensor, The Glucose Biosensor, Microbial Biosensor	
5	**Biosensors For Clinical Analysis**	Biosensors for personal diabetes management (Glucose, Galactose, Gluconate, Lactate, Pyruvate Sensors) Noninvasive Biosensors in Clinical analysis and health care	3
	Total Number of Lectures		**42**

TEXT BOOKS

1	Biosensors: Fundamentals and Application: Anthony P.F. Turner, Isao Karube George S. Wilson, Oxford University Press
2	Body sensor Network: Biosensors and Sensor System. Danny O'Hare g, Imperial College London, London SW7 2BY, UK
3	Introduction to biosensor: from electric circuit to immunosenssor, J.Y.Yoon, Springer,-Switzerland.

REFERENCE MATERIAL:

1	Biosensors and Nanobiosensors: Designand Applications, Ahmed Touhami, University of Texas at Brownsville
2	Electrochemical DNA Biosensor: M.Ozsoz. CRC press, Taylor & Francis group

Other useful resource(s):

- Link to NPTEL course contents: https://nptel.ac.in/courses/118106019/36
- https://nptel.ac.in/courses/105107173/53

Methodology

- The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Biosensors: Principles and Application)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	Average
CO-1	2	2	2	1	2	3	2	1	1	1	2	2	2	1	1.7
CO-2	3	2	3	2	3	2	2	1	2	2	2	3	3	2	2.3
CO-3	3	2	3	2	3	2	2	1	1	1	2	2	2	2	2.0
CO-4	3	2	3	2	3	3	2	1	1	1	2	2	2	2	2.0
CO-5	2	2	2	2	2	3	3	2	2	2	3	3	3	2	2.3
Average	**2.6**	**2.0**	**2.6**	**1.8**	**2.6**	**2.6**	**2 .2**	**1.2**	**1.4**	**1.4**	**2.2**	**2.4**	**2.4**	**1.8**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Business Analytics

COURSE CODE:18B1WHS632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand facets of business analytics within an organization.
2. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
3. To become familiar with the processes needed to develop, report, and analyze business data.
4. To analyze real world business problems, not only with the context of the company but also with the context of the society, with the help of modern concepts and tools and techniques of the concerned area.
5. To provide an optimal solution which benefits both the company and the society as a whole.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understanding the concepts and dimensions of business analytics	Familiarity
CO-2	Formulations of business analytics problems	Assessment
CO-3	Developing and reporting of the problems after proper assessment	Assessment
CO-4	Analyzing problems using different tools and techniques of business analytics	Usage
CO-5	Designing an optimal strategy to help the company	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction and importance to Business Analytics, Categorization of Analytical Methods and Models, Business Analytics in Practice – Marketing, HR, Finance etc.	3
2	**Business Analytics Models:** Overview and Deployment of Business Analytics Models	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Exploring Data:** Describing the distribution of single variable – Types of data, categorical variables etc,; Relationships among variables – categorical variables, categorical and numerical variables and numerical variables	6
4	**Probability and Decision Making:** Probability and distributions – single random variables; Distributions – normal, binomial, poisson and exponential; Decision making under uncertainty – elements of decision analysis, precision tree, Bayes' rule, multistage decision problems; Applications in Business Management	7
5	**Statistical Inference:** Sampling and sampling distributions; Confidence Interval Estimations; Hypothesis testing; Applications in Business Management	7
6	**Regression Analysis:** Regression Analysis – Estimation; Regression Analysis – Inference; Applications in Business Management	8
7	**Simulation Modeling:** Introduction to Simulation Modeling; Simulation Models – Operations, Financials, Marketing Applications in Business Management	9
Total Number of Lectures		**42**

Suggested Text Book(s):

1. S. Christian Albright and Wayne L. Winston: Business Analytics: Data Analysis and Decision Making, Cengage Learning, 5e

Suggested Reference Book(s):

1. Jeffrey D Camm et al.: Essentials of Business Analytics, Cengage Learning
2. Halady P: Business Analytics: An Application Focus, PHI
3. Seema Acharya and R. N. Prasad: Fundamentals of Business Analytics, Wiley
4. Some real life data from different government/non-government sources will also be discussed and analysed.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1-> Unit 1, 2 and 3
2	T-2	25	1.5 Hours	Syllabus covered upto T-2->Upto T1 + Unit 4and 5 (partially)

(Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Attendance – 5 Class Performance - 10 Quizzes –10

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	2	2	2	2	1	2	1	2	3	1	2	1.67
CO-2	0	3	2	3	3	1	1	1	2	1	2	1	1.67
CO-3	0	2	1	1	1	1	1	0	0	1	1	1	0.83
CO-4	1	3	2	3	3	1	2	1	1	1	2	1	1.75
CO-5	0	1	3	3	3	1	1	1	1	1	1	1	1.42
Average	0.20	2.20	2.00	2.40	2.40	1.00	1.40	0.80	1.20	1.40	1.40	1.20	1.47

Assistant Registrar
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC
WAKNAGHAT • WAKNAGHAT • ADDITIONAL

C# and VB.NET

COURSE CODE: 18B1WCI637

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: C/C++ and OOPs

Course Objectives:

1. Knowledge of .NET Framework.
2. Programming in C # and VB.NET in Visual Studio Environment
3. Knowledge of object-oriented programming in the C # and VB.NET languages
4. Programming for windows application development
5. Programming for web application development

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Comprehensive knowledge of .NET Framework, C#.NET and VB.NET	Familiarity
CO-2	Knowledge of C#.NET and VB.NET languages.	Assessment
CO-3	Students will able to develop windows applications using C# and VB.NET	Assessment
CO-4	Students will able to develop web applications using ASP.NET with C# and VB.NET	Assessment
CO-5	Develop a data driven windows and web application	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**.NET Framework**: Introduction to C#.NET, VB.NET and VS.NET, Features of C#.NET,VB.NET and VS.NET, The Common Language Runtime (CLR), Memory Management, Cross Language Integration, metadata and the IL Disassembler. C# and VB.NET basics ,Class, Objects, Inheritance, Polymorphism, Error Handling, Common Type System (CTS), .NET Framework Class Library (FCL), Microsoft Intermediate Language(MSIL), Just In Time(JIT) Compiler, Garbage Collection	7
2	**Windows Programming:** Intro to C# and VB.NET GUI dev in Visual Studio, Windows Forms and built in controls, Delegates and Events, Common Controls, Button, CheckBox, Label, Dialog boxes, TreeView and ListView, Custom Controls etc.	7
3	**ASP.NET using C# and VB.NET**: Introduction of ASP.NET using C# and VB.NET, Concept of Web Applications, ASP.NET Architecture, Page Composition Parts ASP.NET, Page Life Cycle, Page Life Cycle Events, ASP.NET Server Controls, HTML Server Controls, Web Server Controls, List Controls, Validation Controls, User Controls & their uses, Navigation Controls, Login Controls, Custom Controls	11
4	**ADO.NET:** Introduction of SQL, Components of SQL, Basic SQL Commands, Data Binding in ASP.Net, Data Binding Expressions, Data Sources & Controls, Insert, Update, Delete Operations using Data Source Controls, Working with Grid View Control Data bound controls DetailsView control **Security and Deployment:** Security in the .NET framework and Deployment in the .NET	7

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology

IQAC

Total lectures	32

Suggested Text Book(s):

1. .NET Framework Essentials, 3rd Edition by By Hoang Lam, Thuan Thai Publisher: O'Reilly Media
2. Head First C#, 3rd Edition By Andrew Stellman, Jennifer Greene Publisher: O'Reilly Media
3. ASP.NET 4 Unleashed 1st Edition, by Stephen Walther

Suggested Reference Book(s):

1. Pankaj Agrawal – Principal of .Net Framwork
2. Vaya Kogent - .NET Programming Black Book – Wiley
3. VB.NET Black Book by Steven Holzner –Dreamtech
4. VB.NET –Wrox Publication
5. C# programming Black Book by Matt Telles

Other useful resource(s):

1. Link to topics related to course:
   - i. https://docs.microsoft.com/en-us/dotnet/
   - ii. https://msdn.microsoft.com/en-us/library/ff361664(v=vs.110).aspx
   - iii. https://msdn.microsoft.com/en-us/library/aa286485.aspx
   - iv. https://blogs.msdn.microsoft.com/dotnet/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (C# and VB.NET)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	21	3	4.2
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.8	2.8	2.2	2	2.2	3	5	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Systems Biology

14B1WBI732 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology and various kind of biological pathways, graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop system level understanding of biological entities for various kind of pathways.

Course Assessment:

T-1 Test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation

CO II: Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering

CO III: Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems

Topics covered:

Introduction to Systems biology and computational systems biology, basic principles of components and systems. top down and bottom up approaches, reductionist and integrative approaches for dealing with biological systems. Gene regulatory network (GRN) analysis, genes, operons, regulons, stimulons. Symbols on gene networks and pathways and their relation with

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

the involved entities. Experimental and computational methods available for GRN. Signal transduction pathways and metabolic pathways, Modeling Complex Biological Systems, and Mass/Flux Balance Analysis. Stoichiometry analysis for component and systems level along with their applications. XML for Bioinformatics and systems biology, includes BioXML, SBML, CellML and their practical applications towards modeling and simulations of biological systems. Incorporation of MathML and CML into standard markup languages for systems biology. Systems Approach to Metabolic Networks and Protien-Protein Interaction Networks, Online tools, databases, and other web based applications for Systems Biology: STRING, BIND, MINT, IPATH, GeneGo, Gypasi, MetaCYC, EcoCyc, RegulonDB, AtPID, JASPAR, TFDB etc. Biocircuits: Blocks and Designing; Various case studies along with their applications E-Cell, virtual cell and other bio-electronic projects.

Text and Reference books

1. Systems Modeling in Cellular Biology
   by Zoltan Szallasi, Joerg Stelling, Vipul Periwal, MIT Press,
2. Systems Biology : Properties of Reconstructed Networks
   by Bernard Palsson, Cambridge Univ. Press
3. Advances in Systems Biology (Advances in Experimental Medicine and Biology).
   Opresko, L., Gephart, J., and Mann, M. (eds.), Plenum US, 2005
4. Artificial Intelligence Methods and Tools For Systems Biology
   Dubitzky, W. and Azuaje, F. (eds.), Kluwer Academic Publisher
5. Metabolome Analyses: Strategies for Systems Biology
   Vaidyanathan, S. et al (eds.), Springer-Verlag
6. Systems Biology in Practice: Concepts, Implementation And Application
   Klipp, E et al., John Wiley & Sons Inc.
7. Foundations of Systems Biology
   Kitano, H.(ed.); The MIT Press
8. Systems Biology
   Alberghina L. and Westerhoff, H.V., eds.; Springer Verlag

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation	H	H	H	H	H	H	M	95
CO-II	Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering	M	H	H	H	H	H	M	90
CO-III	Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems	H	H	H	M	H	H	H	95
	Assessment (%)	**89**	**100**	**100**	**89**	**100**	**100**	**78**	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Techniques and Algorithms in Engineering

Course Details
Course Code: 18B1WCI733
Level: B Tech CSE/IT
Semester: Semester 7
Instructor: Prof Dr S P Ghrera

Outline Course Description:
Unit I
Matrix Vector and Matrix Matrix Multiplication Algorithms, Gaussian Elimination and Its Variants, Systems of Linear Equations, Triangular Systems, Positive Definite Systems, Cholesky Decomposition, Banded Positive Definite Systems, Sparse Positive Definite Systems, Gaussian Elimination and the LU Decomposition, Gaussian Elimination with Pivoting, Sparse Gaussian Elimination.
Unit II
Sensitivity of Linear Systems,Vector and Matrix Norms, Condition Numbers, Perturbing the Coefficient Matrix, A Posteriori Error Analysis Using the Residual, Roundoff Errors, Backward Stability, Propagation of Roundoff Errors, Backward Error Analysis of Gaussian Elimination,Scaling, Componentwise Sensitivity Analysis.
Unit-III
The Least Squares Problem, The Discrete Least Squares Problem, Orthogonal Matrices, Rotators, and Reflectors, Solution of the Least Squares Problem, The Gram-Schmidt Process, Geometric Approach, Updating the QR Decomposition.
Unit IV
The Singular Value Decomposition, Some Basic Applications of Singular Values,The SVD and the Least Squares Problem, Sensitivity of the Least Squares Problem.
Unit V
Eigenvalues and Eigenvectors, Systems of Differential Equations, The Power Method and Some Simple Extensions, Similarity Transforms, Reduction to Hessenberg and Tridiagonal Forms, The QR Algorithm, Implementation of the QR algorithm, Use of the QR Algorithm to Calculate Eigenvectors.
Unit VI
Iterative Methods for Linear Systems, The Classical Iterative Methods, Convergence of Iterative Methods, Descent Methods; Steepest Descent, Preconditioners, The Conjugate-Gradient Method, Derivation of the CG Algorithm, Convergence of the CG Algorithm, Indefinite and Nonsymmetric Problems.

Assumed Background:
A basic background in engineering mathematics and computational techniques is assumed. In particular, it is assumed that the student has a basic understanding of linear algebra, probability theory, on which the more advanced material in this course will be built.

Course Aims
An course is designed to deepen student knowledge and capability in computational techniques in areas of particular importance to engineering. The course aims to give students the computational tools and theory needed for developing efficient algorithms to solve engineering problems. Specifically, the aim is ensure the student has excellent skills in

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

numerical implementation of advanced methods in linear algebra. The students will be required to use MATLAB as an tool for their work during the course.

Course Outcomes(COs)

Course outcomes (19B1WCI531: Computational Techniques and Algorithms in Engineering)		Level of Attainment
CO-1	Solve systems of linear equations using multiple methods, including Gaussian elimination and matrix inversion. Algorithms for vector and matrix operations,.	Usage
CO-2	Positive Definite Systems, Cholesky Decomposition, LU Decomposition, Sensitivity and roundoff errors	Usage
CO-3	Least Squares Problem, OR Decomposition	Usage
CO-4	SVD and QR algorithm	Usage
CO-5	,Determine eigenvalues and eigenvectors and solve eigenvalue problems	Assessment
CO-6	Iterative algorithms and Convergence	Assessment

Detailed Description

19B1WCI531: Computational Techniques and Algorithms in Engineering

Matrix Vector and Matrix Matrix Multiplication Algorithms, Gaussian Elimination and Its Variants, Systems of Linear Equations, Triangular Systems, Positive Definite Systems, Cholesky Decomposition, Banded Positive Definite Systems, Sparse Positive Definite Systems, Gaussian Elimination and the LU Decomposition, Gaussian Elimination with Pivoting, Sparse Gaussian Elimination	L1-5
Sensitivity of Linear Systems,Vector and Matrix Norms, Condition Numbers, Perturbing the Coefficient Matrix, A Posteriori Error Analysis Using the Residual, Roundoff Errors, Backward Stability, Propagation of Roundoff Errors, Backward Error Analysis of Gaussian Elimination,Scaling, Componentwise Sensitivity Analysis	L6-11
The Least Squares Problem, The Discrete Least Squares Problem, Orthogonal Matrices, Rotators, and Reflectors, Solution of the Least Squares Problem, The Gram-Schmidt Process, Geometric Approach, Updating the QR Decomposition	L12-19
The Singular Value Decomposition, Some Basic Applications of Singular Values,The SVD and the Least Squares Problem, Sensitivity of the Least Squares Problem	L20-23
Eigenvalues and Eigenvectors, Systems of Differential Equations, The Power Method and Some Simple Extensions, Similarity Transforms, Reduction to Hessenberg and Tridiagonal Forms, The QR Algorithm, Implementation of the QR algorithm	L24-30
Iterative Methods for Linear Systems, The Classical Iterative Methods, Convergence of Iterative Methods, Descent Methods; Steepest Descent,	L36-42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Preconditioners, The Conjugate-Gradient Method, Derivation of the CG Algorithm, Convergence of the CG Algorithm, Indefinite and Nonsymmetric Problems.	

Evaluation scheme:

Test 1	15
Test 2	25
Test 3	35
Internal	25(quiz=12,Assignment=9,Regularity=4)
Total	100 marks

Text Book

Fundamentals of Matrix Computations, DAVID S. WATKINS
Linear Algebra Done Right, by Sheldon Axler

References

The following is an excellent text for reviewing fundamental concepts and some applications of linear algebra.

- Gilbert Strang, Linear Algebra and Its Applications, 4th Edition, Brooks Cole, 2006.
- Gene H. Golub and Charles F. Van Loan, Matrix Computations, 3rd edition, John Hopkins University Press, 1996, ISBN 0-8018-5414-8.
- Lloyd N. Trefethen and D. Bau III, Numerical Linear Algebra, SIAM, 1997.
- James W. Demmel, Applied Numerical Linear Algebra, SIAM, 1997.

References on Iterative Methods and Multigrid Methods
The following books are for additional readings on iterative methods and multigrid methods, which are increasingly important but not covered in this course due to time constraint.

- Anne Greenbaum, Iterative Methods for Solving Linear Systems, SIAM, 1997.
- Yousef Saad, Iterative Methods for Sparse Linear Systems, SIAM, 2003.
- William L. Briggs, Van Emden Henson, Steve F. McCormick, A Multigrid Tutorial, 2nd edition, SIAM, 2000.

References on C Programming
If you want to purchase a C book, a classical one is

- B.W. Kernighan, D.M. Ritchie, C Programming Language (2nd edition). Prentice Hall, 1988.
- M. Banahan, D. Brady and M. Doran, The C Book, second edition, Addison Wesley, 1991.
- C Programming, Wikibooks

CO-PO-PSO Articulation Matrix

CO-PO Mappings (15M1WCI432:Advanced Computational Techniques in Engineering)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	83.3
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	86.1
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	80.6
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	83.3
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	80.6
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	86.1
	88.9	72.2	88.9	72.2	83.3	83.3	83.3	83.3	72.2	88.9	94.4	88.9	

PO-1. Engineering knowledge
PO-2. Problem analysis
PO-3. Design/development of solutions
PO-4. Conduct investigations of complex problems
PO-5. Modern tool usage
PO-6. The engineer and society
PO-7. Environment and sustainability
PO-8. Ethics
PO-9. Individual and team work
PO-10. Communication
PO-11. Project management and finance
PO-12. Life-long learning

Attainment of PSOs through COs					
Sr No	PSO-1	PSO-2	PSO-3	PSO-4	
CO-1	3	2	2	2	79
CO-2	2	3	2	3	79
CO-3	3	2	3	2	81
CO-4	2	2	2	2	75
CO-5	2	3	2	3	79
CO-6	3	2	3	2	79

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Average Score	81	82	85	76	

Program Specific Outcomes	
PSO-1	Detailed Knowledge of contemporary issues in CSE.
PSO-2	Strong skills in learning new programming environments.
PSO-3	Ability to analyse, design, model, develop , test and manage complex software and information management systems.
PSO-4	Analysing the impact of Computer Science and Engineering solutions in the societal and human context.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Control Systems

COURSE CODE: 18B1WEC531

COURSE CREDITS: 3

CORE/ELECTIVE: PROFESSIONAL ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand procedures for developing mathematical models of physical systems, and related analytical and numerical methods for predicting their behavior.
2. To understand stability of state space models and their controllability and observability in modern automation and control.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The ability to analyze any physical system using mathematical model.	Familiarity
CO-2	The ability to formulate reduced models for complex systems.	Familiarity
CO-3	The skill to analyze the response of any LTI system.	Assessment
CO-4	The ability to design any system with desired specifications both in time and frequency domain.	Assessment
CO-5	The ability to derive, interpret and solve problems using modern state space control methods for continuous time and discrete time systems.	Usage
CO-6	The skill to apply advance control schemes for various applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Systems and Control: Open loop and closed loop control systems, components of control system: sensors, actuators, controllers, process, modeling principles of physical systems: electrical, mechanical, thermal and pneumatic systems, effect of feedback on gain, stability, sensitivity and noise, characteristics of transfer function models: poles, zeros, stability and minimal realization, block diagram algebra, signal flow graphs, Mason's gain formula, conversion between block diagram and signal flow graph.	6
2	Response Analysis: Standard test input signals, transient and steady state response: first, second and higher order systems, system design specifications,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	error analysis: static and dynamic error coefficients, Effect of adding poles and zeroes, Correlation-ship between time and frequency domain specifications	
3	Stability Analysis: Absolute stability, relative stability, routh-hurwitz, root locus, bode plot, polar plot and Nyquist plot techniques, gain margin and phase margin, constant magnitude loci: M-circles, constant phase Loci: N-circles, nichol's chart. system identification: inverse bode plots. Effect of adding zero to the forward path, effect of adding pole to the forward path.	8
4	Compensator Design: System design specifications, design of compensating networks (Lead, Lag, Lag-Lead) for specified control system performance using root locus and bode plot, concepts and applications of P, PD, PI and PID controllers..	6
5	Linear State Variable Models: Concept of state, state space modeling: SISO and MIMO systems, useful transformations in state space analysis and design, various forms: physical variable form, phase variable form, Jordan canonical form, solution of state equations, computation of state transition matrix: Laplace method, power series method and Cayley Hamilton method, derivation of transfer function from State variable model, decomposition of transfer function: direct decomposition, cascade decomposition, parallel decomposition, characteristics of linear state variable models, natural and forced responses, determination of controllability and observability of a control system using Kalman and Gilbert tests..	8
6	Advanced Control Schemes: Control systems with multiple loops- cascade control, selective control systems: override control, split range control, feed-forward and ratio control, adaptive and inferential control systems.	6
Total lectures		42

Suggested Text Book(s):

1. Benjamin C. Kuo: Automatic Control Systems, 9th Ed., Prentice Hall of India, 2014.
2. Nagrath& Gopal: Control System Engineering, 6th Ed., New Age International Pvt Ltd, 2018.
3. Stephanopoulos, G.: Chemical Process Control, 1st Ed., Prentice Hall of India, 2008.

Suggested Reference Book(s):

1. K. Ogata: Modern Control Engineering, 5th Ed., Prentice Hall India Learning Private Limited, 2010.
2. Norman S. Nise: Control Systems Engineering, 6th Ed., John Wiley & Sons Inc, 2010.
3. Richard C Dorf, Robert H Bishop: Modern Control Systems, 12th Ed., Pearson Edu Pearson, 2014.

Other useful resource(s):

4. Link to NPTEL course contents: Control systems
https://onlinecourses.nptel.ac.in/noc18_ee41/preview

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (3) - 10 Quizzes(3) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

[DAMS AND RESERVOIR DESIGN]

COURSE CODE: 10B13CE735

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: [3-0-0]

Pre-requisite: Water Resource Engineering, Geotechnical Engineering

Course Objectives:

1. To introduce the students to the basic knowledge of dams and their appurtenances.
2. To develop an understanding regarding selection of a suitable dam for a particular site.
3. Impart knowledge about the construction, design and maintenance of various dams.
4. Train the students to analyze various dams to check their stability and safety.
5. To apply the principles of water resource and irrigation engineering and excel the students in the computation of the reservoir capacity which is indispensible for deciding the inundation area and demand pattern for any dam.
6. To enable the students to apply their knowledge of mechanics to calculate the critical stresses and various forces(static and dynamic) to ensure the proper design and stability of the dam.
7. To introduce the students to the various modern techniques and various challenges of dam construction by exposing them to real field conditions incorporating modern pedagogical methods of learning.
8. To train the students to use software tools for the modeling and analysis of various dams.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Select the suitable site for construction of different dams and suggest the type of dam required as per the topographical, functional, economical and ecological considerations.	Familiarity
CO-2	Know about the various components of a dam, their functions and types.	Familiarity
CO-3	Calculate the reservoir capacity based on demand (outflow) and supply (inflow) patterns.	Assessment/ Usage
CO-4	Calculate the forces and stresses coming on gravity and earthen dams due to static and dynamic forces prevalent in nature	Assessment
CO-5	Analyze the dam for its safety against various forms of failure and suggest the preventive measures.	Assessment/ Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course Contents:

Unit	Contents	Lectures required
1	**Introduction and project planning:** Dams and their historical emergence, requirement and types of dams, dam appurtenances. Planning of project, Purpose of development, Project study, Ecological and environmental considerations, Flood studies, Economic consideration, Physical factor governing selection of type, legal, economic, aesthetic considerations, foundation and construction materials. Investigation, Source of information, Surface exploration, sampling, Field and laboratory tests.	12
2	**Reservoir studies:** Types of reservoir, inflow and outflow study into the reservoir, capacity determination by various techniques	6
3	**Concrete gravity dam:** Introduction, Origin and development, Forces acting on dam, Requirements for stability, Dams on pervious foundations	9
4	**Earthfill dams:** Origin , Selection of type, Design principles, Foundation design, Embankments, Embankment details	9
5	**Rockfill dams:** Origin and usage, Definition and types , Foundation design, Embankment design, Membrane design .	6
Total lectures		42

Suggested Text Book(s):

1. S.K. Garg: Irrigation Engineering and Hydraulic Structures, 19th Edition, Khanna Publishers, 2005.
2. W.P.Creager, J.D.Justin and J.Hinds: Engineering for dams, Wiley, 2007.

Suggested Reference Book(s):

1. Trevor Turpin: Dams, First edition, Reaktion Books Publishion, 2008.
2. S.K. Ukarande: Irrigation and Hydraulic structures, Third Edition, Ane Books Pvt. Limited, 2017.
3. I.H. Siddhiqui: Dams and Reservoirs: Planning and Engineering, First Edition, OUP Pakistan, 2008

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	3	1	2	2	2	2	2	2	2.09
CO-2	3	1	3	2	2	3	2	3	2	2	1	2	2.17
CO-3	3	2	3	2	3	2	1	3	1	2	1	2	2.08
CO-4	3	3	3	2	3	3	2	3	3	3	2	2	2.67
CO-5	3	2	2	3	3	3	2	2	3	3	2	2	2.50
Average	3	2	2.8	2	2.8	2.4	1.8	2.6	2.2	2.4	1.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Compression

COURSE CODE: 18B1WCI532

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Digital image processing, UG mathematics, vectors, basic programming skills

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques" case studies	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: Definitions, Historical background, Applications, Taxonomy	2
2	**Intuitive Compression:** Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move-to Front Coding, Scalar Quantization	4
3	**Statistical Methods Information:** Theory Concepts, Variable- Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, Shannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic coding, Adaptive Arithmetic Coding, QM Coder, Text Compression, Context-Tree Weighting	5
4	**Dictionary Methods:** String Compression, Simple Dictionary Compression, LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1,LZRW 4, LZW, LZMW, LZAP, LZY, LZP,	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Repetition Finder, UNIX Compression, The V.42bis Protocol, XML Compression: XMill, EXE Compressors, CRC, Data Compression Patents	
5	**Image Compression:** Approaches to Image Compression; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Simple Images: EIDAC, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context-Based Methods, FELICS, Progressive FELICS, Differential Lossless Compression	6
6	**Wavelet Methods:** Fourier Transform, The Frequency Domain, Fourier Image, Compression, Multiresolution Decomposition, The Laplacian Pyramid, SPIHT, CREW. EZW, DjVu, JPEG 2000	6
7	**Video Compression:** Analog Video , Composite and Components Video, Digital Video, Video Compression, MPEG, MPEG-4, H.261 **Audio Compression:** Sound, Digital Audio, The Human Auditory System , μ-Law and A-Law Companding, ADPCM Audio Compression, MLP Audio, Speech Compression, Shorten MPEG-1 Audio Layers	7
8	**Other Methods and Application:** Zip and Gzip, PNG, The Burrows-Wheeler Method, Symbol Ranking, ACB, SortBased Context Similarity, Sparse Strings, Word-Based Text Compression, Textual Image Compression, Dynamic Markov Coding, FHM Curve Compression, Sequitur, Triangle Mesh Compression: Unicode Compression	6
Total Lectures		**42**

Suggested Text Book(s):

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006

Suggested Reference Book(s):

1. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
2. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
3. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
4. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
2. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course Outcomes (Data Compression)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	3	2	3	3	3	3	1	2.4
CO-2	2	2	2	2	3	3	2	3	3	3	1	3	2.4
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.3	2.6	3	2.3	2.7	2.7	3	2.4	2.6	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Design of Dependable Systems

COURSE CODE: 18B1WEC846

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Graph Theory and Computer Communication Network

Course Objectives:

1. Incorporate the concepts of dependability in the design of critical systems.
2. Propose an architectural framework for the design of systems based on information and communication technologies.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Introduction to dependability attributes such as availability, reliability, safety, QoS, SLA in systems.	Familiarity
CO-2	Familiarization with dependability analysis approaches.	Familiarity
CO-3	Application of methodologies used dependability modeling.	Usage
CO-4	Design of dependability schemes on practical systems.	Usage
CO-5	Evaluation of survivability of networks, dependability evaluation of networks.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Dependability attributes: availability, reliability, safety, QoS, SLA.	5
2	Analysis Approach of Dependability: The failure process, failure semantics, fault handling and maintenance, failure rate, probability distributions, series/parallel systems, Markov models.	6
3	Dependability modeling: Block diagrams and state diagrams - discrete and continuous time Markov models. Fault Trees and Fault Injection. Modeling of software failure, prediction of software failure rates, and impact of software failures on systems behavior.	8
4	Design of Dependability: Fault tolerance, types of redundancy, design principles and mechanisms. Fault detection, tolerance and recovery, Lifetime improvement.	8
5	Prediction of hardware failure rates: Software/hardware and architectural approaches space, information and time redundancy. Design for testability. Model-driven approaches Diagnosis.	7
6	Internet QoS, survivability of networks, dependability evaluation of networks taking the traffic carrying (QoS) requirements into account. QoS guarantee analysis. Some applications of dependability in IT related services.	8
Total lectures		42

Suggested Text Book(s):

1. Ajit Kumar Verma, Srividya Ajit, Dependability of Networked Computer-based Systems, Springer Series in Reliability Engineering, 1st edition, 2013.
2. J.C. Geffroy, G. Motet, Design of Dependable Computing Systems, Springer-Science-Business Media B.V., 1st edition, 2002.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3. J.C. Laprie, Dependability: Basic Concepts and Terminology, Springer-Verlag,1st edition,1992.

Suggested Reference Book(s):

1. Dhiraj K. Pradhan, Fault-tolerant computer system design, Prentice-Hall,1st edition, 1996.
2. M.L. Shooman, Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design, Wiley, 1st edition, 2002.
3. Krishna B. Misra, Handbook of Performability Engineering, Springer, 1st edition,2008.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc16_oe01/preview
2. Link to topics related to course:https://www.mdh.se/utbildning/livslangtlarande/prompt/design-of-dependable-and-fault-tolerant-embedded-systems-1.120193?l=en_UK

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Design of Dependable Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	2	2	2	2	2	2	2	2
CO-2	2	2	2	2	3	2	2	1	1	3	2	2	2
CO-3	3	2	2	2	2	3	3	2	2	2	3	2	2.33
CO-4	2	3	2	3	3	2	3	2	3	3	2	3	2.6
CO-5	2	2	3	2	2	3	3	1	2	2	2	2	2.16
Average	2.4	2.2	2.2	2	2.4	2.4	2.6	1.6	2	2.4	2.2	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JUIT IQAC

DIGITAL SYSTEM DESIGN

(Elective Subject)

Course Code:	12B1WEC732	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. To design digital circuits based on the required application
2. It offers a profound understanding of the design of complex digital circuits and their implementation for real time applications.

Course Outcomes

After studying this course the students would gain enough knowledge

1. To use state machine diagrams to design finite state machines using various types of flip-flops and combinational circuits with prescribed functionality.
2. Design state machines to control complex systems.
3. Define and describe digital design flows for system design and recognize the trade-offs.
4. Understand and design System controllers.
5. The ability to identify and prevent various races and hazards and timing problems in a digital design.
6. Write synthesizable VHDL program.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Digital Design Concepts, Review of digital design fundamentals, minimization and design of combinational circuits, sequential machine fundamentals: the need, concept of memory, Flip flops, sequential machine operations, classifications.	Text Book 1: Chapter 1-5	4
2.	Design of Synchronous Sequential Circuits-Sequential circuits, Finite state model – Basic definition, capabilities and limitation of finite state machines, state equivalence & machine minimization, simplification of incompletely specified machines, Extraction of maximal compatibles, synthesis & analysis of synchronous sequential circuits. Introduction to Multi-Input System controller design: system controllers, frequency and time consideration, MDS diagram generation, CPLD and FPGA	Text Book 1: Chapter 6	12

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	level custom design.		
3	Design of Asynchronous Sequential Circuits - Introduction to asynchronous circuits, timing diagram, state diagram & flow tables, types of asynchronous circuits, fundamental mode circuits, pulse mode circuits, state assignment in asynchronous sequential circuits, Synthesis and analysis, ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, Data path control path partition-based design	Text Book 1: Chapter8	12
4	Hazards and Races - Introduction, gate delays, generation of spikes, production of static hazards in combinational networks, elimination of static hazards, design of hazard free combinational networks, hazard free asynchronous circuit design, dynamic hazards, essential hazards, Races and Cycles.	Text Book 3: Chapter 10	8
5	VHDL/ Verilog HDL - Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches. Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.	Text Book 4: Chapter 1-3	6
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. John M Yarbrough : Digital Logic Applications and Design, 2nd Edition, Thomson Educaion

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. W. I. Fletcher :An Engineering approach to Digital Design , PHI
3. M.Morris Mano : Digital Design, 3rd edition, Pearson Education, 2007.
4. Michael D. Ciletti: Advanced Digital Design with Verilog HDL, PHI, 2005.

Reference Books

1. Digital Systems Design using VHDL – Charles H Roth, CENGAGE Learning.
2. Switching and Finite Automata Theory by ZVI Kohavi, TMH

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Financial Planning

COURSE CODE: 18B1WHS638

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Understand the issues involved in planning finances and investments at a personal level.
2. A deeper understanding of concepts and issues relating to personal finance.
3. Applications of financial planning and investments to real life situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Financial planning process	Familiarity
CO-2	Terms and concepts relating to personal financial planning.	Familiarity
CO-3	Concepts and issues relating to management of money such as taxes, investments, loans, insurance policies etc. so that students are able to spend and invest their hard earned money wisely.	Familiarity/ Assessment/ Usage

Course Contents:

Unit	Contents	Lectures required
1	**Financial Planning Process**: Meaning of financial planning; Steps in financial planning process; Determinants of personal income.	3
2	**Financial Statements and Plans:** Role of financial statement in financial planning; Preparing a personal balance sheet; Preparing the income and expense statement using personal financial statements; Cash Budgets.	3
3	**Taxes**: Concepts of income tax; Personal taxation; Tax planning.	6
4	**Cash and Savings:** Role of cash management in personal financial planning; Financial services market; Cash management products; Electronic banking services; Channels of savings.	3
5	**Purchase of Automobiles and Houses:** Automobile purchase planning and Car loans; The home buying process and Home loans.	6
6	**Credit and Credit Cards:** Credit; Types of credit; Different kinds of credit cards; Disadvantages of the credit cards.	3
7	**Life Insurance:** Insurance planning; Benefits of life insurance; Calculating insurance needs; Buying a life insurance; Life insurance products in India.	4
8	**Health Insurance:** Types of health care plans; Health Insurance in India.	3
9	**Investments:** Meaning of investment; Types of investment Vehicles; Factors considered in the choice of investments; Developing the investment strategy; Investing in equities, mutual funds and fixed income securities.	8
10	**Retirement Planning:** Sources of retirement income; Pension funds.	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Total lectures	42

Suggested Text Book(s):

1. Lawrence J Gitman and Michael D Joehnk. Personal Financial Planning.
2. Ernst and Young's Personal Financial Planning guide.

Suggested Reference Book(s):

1. S G Victor Hallman and Jerry S Rosenbloom, 6th Edition, Mc GRaw Hill. Personal Financial Planning

Other useful resource(s):

1. https://www.incometaxindiaefiling.gov.in/home
2. https://www.cibil.com/
3. http://www.bankbazaar.com/finance-tools/emi-calculator.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Quiz (2) - 10 Case study (2) - 5 Class assessment - 5 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Financial Planning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	1	1	1	0	1	1	1	0	0	3	3	1.00
CO-2	0	1	1	2	1	2	2	1	0	0	3	3	1.33
CO-3	0	3	3	3	3	3	3	1	1	1	3	3	2.25
Average	0.00	1.67	1.67	2.00	1.33	2.00	2.00	1.00	0.33	0.33	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 29.11.2021

FPGA based Instrumentation System Design

COURSE CODE: 18B1WEC744

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Digital Electronics, Basic Electronics

Course Objectives:

1. Learn and understand the FPGA design flow
2. Learn to implement basic arithmetic circuits and DSP algorithms in FPGA using IP cores.
3. Learn to determine circuit speed, to check timing violations and techniques to fix them.
4. Learn to apply the knowledge gained to break an algorithm into arithmetic functions and implement in FPGA with/without using IP cores.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Explain the concept and basic structures of Field Programmable Gate Array (FPGA), and techniques to implement programmable logic circuits using typical FPGA design flow	Familiarity
CO-2	Implementing basic arithmetic circuits and ASICs for simple DSP functions, such as filters using user defined or vendor provided IP cores	Assessment
CO-3	Determining circuit speed, checking timing violations and techniques to fix the timing violations.	Usage
CO-4	Design issues in cross clock domains communication in high-speed ASIC design	Assessment
CO-5	Break any given algorithm to sub-modules and implement the same on FPGA using HDLs and various IP cores	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to FPGA : From discrete logic to FPGAs, flexibility and functionality, FPGA vs Programmable DSPs, FPGA technology - roadmap, clocking, data and sample rates, slices and configurable logic blocks, memory and registers, performance ratings, families DSP and FPGAs: FPGA elements for DSP algorithms, FPGA- Based System Design Examples	6
2	Verilog HDL: Data types, operators, Multiplexers, decoders, adders, Subtractor, de-multiplexers, flip-flops, counters, state machine, ALU with adder/Subtractor and shifter, multiply and divide hardware synthesis, memory, using a test bench for verification and simulation Concept of state machine and VHDL implementation, simulation synthesis, verification, : FSM Types, Implementation in HDLs, a simple computer design, other Design examples and case studies	12
3	Digital System Design: Combinational and sequential circuits, Classification of sequential circuits, Registers. Design & analysis of synchronous and asynchronous sequential circuits: Counters.	6
4	Embedded Systems & FPGAs: FPGA as a systems on chip platform, FPGA on-chip network standards, FPGAs as custom microcontroller and hybrid DSP microcontroller devices, Multiple cock domains on chip, Multi FPGA systems, multiple-clock domains, program and data memory, SRAM and DRAM., ROM, PAL, and PLA, Timing Constraints, using IP cores: instantiation and simulations	6
5	Instrumentation System: Basic concepts, Weighted Resistor D/A converter, A/D Converter, programmable ICs, digital potentiometers, various data communication and interfacing protocols (UART, SPI, I2C and others) and FPGA implementation case studies	12
Total lectures		42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Michael D. Ciletti: Advanced Digital Design with the Verilog HDL, 2nd Edition, Pearson, 2011.
2. Jean- Pierre Deschamps, Gustavo D. Sutter, Enique Cano: Guide to FPGA Implementation of Arithmetic Functions, Springer, 2012.

Suggested Reference Book(s):

1. Hamblen, J.O, Hall, T.S, and Furman, M.D., "Rapid Prototyping of Digital Systems, SOPC Edition." Springer, 2008.
2. Zainalabedin, Navabi, "Digital Design and Implementation with Field Programmable Devices", Springer, 2005.
3. Jean- Pierre Deschamps, Gery Jean Antoine Bioul, Gustavo D. Sutter, "Synthesis of Arithmetic Circuits-FPGA ASIC and Embedded Systems" , a John Wiley & sons, inc, publication, 2006.

Other useful resource(s):

1. FPGA manufacturer's web resources:
   Altera Inc.: https://www.altera.com/products/general/fpga/stratix-fpgas/about/stx-asic-prototyping.html
   Xilinx: https://www.xilinx.com/applications/asic-prototyping.html
2. Other Journal/research resources:
   http://biomedical-engineering-online.biomedcentral.com/articles/10.1186/1475-925X-13-126
   http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.470.6049&rep=rep1&type=pdf
3. NPTEL Resources
   https://nptel.ac.in/courses/117108040/
   https://nptel.ac.in/courses/117106092/55
   https://nptel.ac.in/syllabus/117108040/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (FPGA based Instrumentation System Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	2	x	1	3	3	1	2	1.67
CO-2	3	2	3	1	2	2	x	x	3	1	1	2	1.67
CO-3	3	3	3	2	3	2	x	x	3	2	1	2	2.00
CO-4	3	3	3	2	3	2	x	x	3	2	1	2	2.00
CO-5	3	3	3	3	3	2	x	x	3	2	1	2	2.08
Average	3	2.6	3	1.8	2.6	2	0	0	3	1.6	1	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Fundamentals of Digital Image Processing

COURSE CODE: 18B1WEC536

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms for basic and advanced image analysis
3. Assess the performance of image processing algorithms and systems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Analyze general terminology of digital image processing.	Familiarity
CO-2	Examine various types of images, intensity transformations and spatial filtering.	Familiarity
CO-3	Develop Fourier transform for image processing in frequency domain.	Assessment
CO-4	Evaluate the methodologies for image segmentation, restoration etc.	Usage
CO-5	Implement image process and analysis algorithms.	Usage
CO-6	Apply image processing algorithms in practical applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Digital Image Fundamentals: Introduction, Image sensing and acquisition, Image Sampling and quantization, Spatial and Gray level resolution, Zooming and Shrinking, Relationships between pixels, Linear and Nonlinear operations.	7
2	Image Enhancement in the Spatial Domain: Gray Level Transformation, Histogram Processing Techniques, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters.	8
3	Image Enhancement in the Frequency Domain: Properties of frequency domain, two dimensional Fourier Transform and its properties, Correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	6
4	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	6
5	Image Compression: Fundamentals of image compression, Image compression models, Variable length coding, Huffman coding, Near optimal variable length coding, Arithmetic coding, Constant area coding, Run length coding, Image compression standards (JPEG, JPEG2000).	7
6	Image Segmentation: Detection of discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation.	8
Total lectures		42

Suggested Text Book(s):

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", fourth Edition, Pearson Education, 2018.

Suggested Reference Book(s):

1. Anil K. Jain, "Fundamentals of Digital Image Processing", First Edition, PHI Learning Pvt. Ltd, 2015.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. Willliam K Pratt, "Digital Image Processing", Fourth Edition, John Willey, 2007.
3. S.Sridhar, "Digital Image Processing", Second Edition, Oxford University Press, 2016
4. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Fundamentals of Digital Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	1	1	2	2	2	2	1.92
CO-2	3	3	3	3	3	1	1	1	2	2	1	2	1.08
CO-3	3	2	2	2	3	2	1	1	2	2	1	2	1.92
CO-4	3	3	3	3	2	1	1	1	2	3	2	2	2.17
CO-5	3	3	2	3	2	2	2	2	2	3	3	2	2.42
CO-6	3	2	3	3	2	2	2	1	2	2	3	2	2.00
Average	3.00	2.50	2.50	2.67	2.3	1.67	1.33	1.17	2.00	2.33	2.00	2.00	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology

Department of Computer Science and Engineering

B.Tech (CSE& IT) Semester VII

Course Information:

Course Title:	Graph Algorithms and Applications
Course Code:	10B1WCI733
Credits:	Three (3)
Instructor:	Ravindara Bhatt
Office:	1st Floor, Vivekananda Bhawan
Telephone:	01792-239335

Course Contents: As in the handbook

Examination System:

Term Tests:	75%	(T1: 15%; T2: 25%; T3: 35%)
Internal Assessment:	25%	(Assignment -12,Quizzes -9,Class participation -4)

References:

1. Deo, N., Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall, 1974.
2. Douglas B. West, Introduction to Graph Theory, PHI, second edition, 2001.
3. Cormen, T., Leiserson, C.,Rivest, R. and Stein, C., Introduction to Algorithms., MIT Press, 2001.
4. Gibbons, A., Algorithmic Graph Theory, Cambridge University Press, 1985.
5. Aho, A., Hopcroft, J. and Ullman, J., The Design and Analysis of Computer Algorithms, Addison-Wesley, 1974.
6. Rosen. K, Discrete Mathematics and its Applications, McGraw-Hill, 2007.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Human Resource Management

COURSE CODE: 18B1WHS633

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn HRM basic concepts its functions and importance in the dynamic business environment
2. Learn the roles and functions of various organizational departments
3. Learn how to develop and acknowledge training and development needs for the employees. Design training programs and also design and formulate employee performance appraisalsand compensation plans.
4. Learn the strategies human resource management ,policies and functions
5. Learn the concept and usage of HRM in global era

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To have an understanding of the basic concepts, functions and processes of human resource management	Familiarity
CO-2	To be aware of the role, functions and functioning of human resource department of the organizations.	Familiarity
CO-3	To Design and formulate various HRM processes such as Recruitment, Selection, Training, Development, Performance appraisals and reward Systems, Compensation Plans and Ethical Behavior.	Assessment
CO-4	Develop ways in which human resources management might diagnose a business strategy and then facilitate the internal change necessary to accomplish the strategy	Usage
CO-5	Evaluate the developing role of human resources in the global arena.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Human resource management:** Aims and Characteristics of HRM, How HR impacts on organizational performance, Role of HR practitioner, HRM policies, Strategic role of HRM	3
2	**Organization design and Planning:** Organization design, Types of organization design, Elements of Organization design. The process of organizing and its aim, Conducting organization reviews, Organization analysis and diagnosis, Organization planning	3
3	**Job analysis:** Nature and use of Job analysis information, Steps in job analysis, Methods of Collecting Job analysis Information, Writing job descriptions and job specifications.	4
4	**Personnel planning and Recruiting:** Planning and recruiting, Recruiting a diverse workforce	5
5	**Employee Management and Selection and Interviewing :** Selecting Human Resource, Inducting and Placing New Hires	4
6	**Training and Developing Employees :** Training Process, methods, Managing Organizational Change and Development	5

Deputy Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

7	**Performance Management and Appraisal :** Basic concepts in Performance Management and Appraisal, Introduction to Appraising performance, appraising performance: problems and issues	3
8	**Designing Strategic pay plans :** Establishing pay plans, competency based Pay, Compensation Trends	3
9	**Employee relations:** Ethics and Fair Treatment at work, role of HR Management in Fostering Ethics and Fair treatment, Employee Discipline and Privacy, Managing Dismissal	3
10	**Employee Safety :** Responsibilities and rights of Employers and Employees,Workplace Health Hazards,Occupational Security, Safety and Health	3
11	**Contemporary issues in HRM :** Major challenges ahead of HRM and HR Responses	2
12	**International HRM :** Domestic HRM compared to International HRM, Expatriate problems	2
13	**The e-HRM :** Nature , e-activities ,recruitment , selection, performance management, compensation	2
Total lectures		**42**

Suggested Text Book(s):

1. Dessler, G.& Varkkey B.(2011) *Human Resource Management*, 12th Ed, Pearson Educatio
2. Aswathappa K. (2005) *Human Resource and Personnel Management*,4th Ed,Tata Mc Graw Hill Publishing Co. Ltd
3. David Lepak\ Mary Gowan, Humann Resource Management: managing Employees for the Competitive advantage

Suggested Reference Book(s):

1. Durai, P. (2010), *Human Resource Management*, Pearson Education
2. Snell/ Bohlander, *Human resource Management*, Cengage Learning

Other useful resource(s):

1. http://aise.swlearning.com
2. www.pearsonhighered.com/lepak

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 29.11.2021

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-6	0	2	3	2	3	0	1	2	2	1	2	1	1.9
CO-7	0	2	2	2	1	2	1	2	2	1	0	2	1.7
CO-8	0	2	3	2	1	1	1	2	2	3	2	1	1.8
Average	0	1.6	2	1.6	1.6	1.5	1	2	2.1	1.6	1.5	1.3	

Human Rights For Technocrats

COURSE CODE: 18B1WHS832

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Conceptual background of human rights and duties:** Definitions and classifications	2
2	**Meaning and Significance of Human Rights :** Scope of the Human Rights	2
3	**Relationship between Rights and Duties:** Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	**Universal Declaration of Human Rights: Technical background :** Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5

Approved in Academic Council held on 29.11.2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**History of human rights civilization:** Brief history of human Rights, The Spread of Human Rights, Middle Ages, Modern human rights	5
6	**Human rights movements :** Anti-colonialism, World War II and the United Nations, Global human rights struggles, Changes in the 1970s Since the 1990s	8
7	**Enforcement and protection mechanism of human rights in India :** Judiciary, National Human Rights Commission and other Commissions and Committees , Non-governmental organizations, Information Media, Education	5
8	**Development, international trade and human rights:** Right to development: Issues of international equity and justice, equitable access to benefits of science and technology, Freedom of international trade, most- favoured nation treatment (equality of treatment) versus special treatment of the developing countries, access to international markets, equitable pricing of raw material	5
9	**Human rights, science and technology:** Overview,violation of human rights by technology	3
10	**Human rights of the working class:** Labour welfare legislation in India, Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	4
Total lectures		**42**

Suggested Text Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Suggested Reference Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Other useful resource(s):

1. https://www.google.com/search?q=Meaning+and+Significance+of+Human+Rights&rlz=1C1GCEU_enBIN820IN820&oq=Meaning+and+Significance+of+Human+Rights&aqs=chrome..69i57j0l5.1710j0j7&sourceid=chrome&ie=UTF-8
2. https://www.equalityhumanrights.com/en/human-rights/what-are-human-rights

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Presentation (1)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Human Rights for Technocrats)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

COURSE DESCRIPTION

Course Name:	**Image Processing Techniques**
Course Code:	10B1WCI737
Course Credits:	3 (3-0-0)
Branch and Semester:	B.Tech – 7th Semester (CSE/IT/ECE)
Session:	July – December, 2017
Faculty Coordinator:	Dr. Amit Kumar Singh

Pre-requisites: Linear algebra, Matrices, Matrix Operations, Determinants, Systems of Linear Equations, Eigen values, Eigenvectors, Statistics and probability, Programming experience, preferably in matlab, and/or C/C++/C#/Python/Java

Objective: The aim of the course is to introduce the student to various image processing techniques. The student learns about image fundamentals, describes the main characteristics of digital images, how they are represented, mathematical transforms such as such as Fourier, Cosine transforms, Singular value decomposition, 2D Wavelet transform, image enhancement techniques, Image restoration and denoising, segmentation, lossy and lossless data compression algorithms, binary and color image processing. The student will be exposed to dealing with image data through programming assignments using matlab, and/or C/C++/C#/Python/Java.

Learning Outcome:

Upon completion of this course, a successful student should be able to design and implement programs that deal with image data.

- To understand how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.
- Emphasis will be to develop engineering skills and intuitive understanding of the tools used in Image Processing.
- The students would be encouraged to design and develop the image processing algorithms/tools to real life problems.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course contents:

S. No.	Topic	L
1	**Introduction to Digital Image Processing** Introduction to images and its processing, Components of image processing systems, image representations, Image file formats, Applications of digital image processing, image sampling and quantization, Image Analysis, Intensity transformations, contrast stretching, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.	5
2	**Image Transformation Techniques** Need for transform, Fourier, Cosine transforms, Haar, KL Transform, Singular value decomposition, 2D Wavelet transform, Different properties of image transform techniques.	8
3	**Image Compression Basics** Concept of image compression, lossless techniques (Huffman Coding, Arithmetic and Lempel-Ziv Coding, Other Coding Techniques) and lossy compression techniques (Transform Coding & K-L Transforms, Discrete Cosine Transforms, and BTC), Multi-Resolution Analysis, and Still Image Compression Standards (JBIG and JPEG),	8
4	**Image Enhancement** Enhancement in spatial and transform domain, histogram equalization DirectionalSmoothing, Median, Geometric mean, Harmonic mean, Cont raharmonic mean filters, Homomorphic filtering,Color image enhancem ent.	5
5	**Image Restoration and Denoising** Image degradation, Type of image blur, Classification of image restoration techniques, ,image restoration model, Linear and non linear restoration techniques, Image denoising, Median filtering	5
6	**Image Segmentation** Classification of image segmentation techniques, Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation	5
7	**Binary and Color image processing** Binarization, Basic Set theory, Binary morphological operations and its properties, Color Image Representation in MATLAB, Converting Between Color Spaces, The Basics of Color Image Processing, Color Transformations, Spatial Filtering of Color Images, Working Directly in RGB Vector Space	5
8	**Image Processing Applications:** Case studies	4
	Total Hours	**45**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	Test -1	15	1 hr.	Syllabus covered up to Test- 1.
2	Test -2	25	1.5 hr.	Syllabus covered up to Test- 2.
3	Test -3	35	2 hr.	Complete Syllabus.
4	Assignments/Homework/Small Projects (5), Quizzes (5), Regularity in Attendance (5), Researching and presenting a technology review topic (10)	25	Entire Semester	5+5+5+10
	TOTAL =	**100**		

Recommended Books

1. Digital Image Processing, R.C. Gonzalez and R.E. Woods, 2nd edition, Pearson Prentice Hall, 2008
2. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, 1989.
3. Digital Image processing, S Jayaraman, TMH, 2012
4. William K. Pratt, *Digital Image Processing*, 3rd Edition, John Wiley, 2001.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	Industrial Enzymes	**(Core Course)**
Course Code	11B1WBT833	
Course Credit	4	
Course Coordinator	Dr. Ashok Kumar	
Pre-requisite	Enzyme production purification and applications	

L	T	P
4	0	0

Course Objectives

The objective of the course is to develop an understanding of important aspects of production and purification of industrially important enzyme and their application in industry.

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	To develop an understanding of basic concepts of enzymes.
CO II	To understand the basic mechanism of action and working behaviour of enzymes
CO III	To familiarize the students with various applications of enzymes in laboratory as well as Industrial scale.
CO IV	To conceptualize about immobilized enzyme technology, and other specific enzymes and their applications.
CO V	To familiarize the students with present potential of enzyme in industrial application and improved activity of the enzyme using various molecular biology techniques.
CO VI	To understand the principle and function of enzyme in various adverse conditions like high temperature and pH(s).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Enzymes: Basic concepts**	Enzymes as powerful and highly specific catalysts, Classification of enzymes, free energy and enzymes, the formation of the transition state, catalytic strategies. General properties: Enzyme specificity, stability and structure, Factors affecting enzyme activity; effect of pH and Temperature, Substrate and Enzyme concentration.	5
	Enzyme Kinetics	Enzyme kinetics: Michaelis-Menten kinetics, evaluation of parameters in the Michaelis-Menten equation, 3-D structure of active site, Kinetics of single and bi-substrate enzyme catalysed reactions, Inhibition & its kinetics.	5
2	**Enzymes: Production and purification**	Enzyme preparation techniques: Sources of enzymes, production, Recovery and purification of intracellular products: cell disruption, chromatographic techniques. Analytical assays of purity level of enzymes.	3
3	**Enzyme preparation and application in industries**	Application of enzymes in leather, glucose syrup production, starch and sugar industry, Dairy and food industry, Beverage industry, Textile industry. Hydrolysis of starch and cellulose. Catalytic functions of Cellulase, lipase, esterase laccase amylase, glucose isomerase, protease, xylanase, invertase, peroxidises. Other applications of enzymes in solution: medical applications of enzymes, non-hydrolytic enzymes in current and developing industrial technology.	10
4	**Enzymes: engineering and improved properties**	Enzyme engineering: Mechanisms and manifestations of protein denaturation. Strategies for enzyme stabilization: Physical and chemical modifications, Selection, directed evolution and Rational design. design and construction of mutant enzymes, Bifunctional and polyfunctional enzyme, Enzyme in organic solvents.	5
5	**Immobilized-enzyme technology**	Immobilized-enzyme technology: Introduction, enzyme immobilization method: Entrapment, carrier-binding and cross-linking method. Medical and analytical applications of immobilized enzymes.	8
6	**Specified Enzymes and applications**	Thermozymes, Cold adapted enzymes, Ribozymes, Hybrid enzymes, Diagnostic enzymes, Therapeutic enzymes: Characteristics, principles and applications.	6
		Total Number of Lectures	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Devasena, T., "Enzymology", 1st ed., Oxford University Press, 2010
2	Berg, J.M., Tymoczko, J.L. and Stryer, L., "*Biochemistry*", 5th ed., W.H. Freeman and Company, New York, 2002.
3	Nelson D.L., Cox M.M., "Lehninger Principles of Biochemistry", 5th ed., W.H. Freeman and Company, New York, 2008.

REFERENCE BOOKS

1	1. Pye, E.K. and Wingard, L.B., "*Enzyme Engineering II*", Plenum Press, 1974.
2	2. Illanes A, "Enzyme Biocatalysis", Springer Science, 2008.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Information Theory and Coding Lab

COURSE CODE: 18B1WCI571
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. To develop skills for designing programs on different coding techniques.
2. Understand how coding theory is concerned with techniques to realize the limits specified by information theory, and learn the techniques of source coding and channel coding.
3. Get an idea of the broad areas where information theory is used i.e. in statistics, data analysis, cryptography, etc.,
4. Identify how development of information theory and coding theory has been crucial to the development of communications.

Course Outcomes:

S. NO	Course Outcomes	Level of Attainment
CO-1	Understand the basics of information theory and how it is concerned with the fundamental limits of communication	Familiarity
CO-2	Design and implement concept of coding and compression techniques	Familiarity
CO-3	Design applications with error control	Usage
CO-4	Design and implement Compression And Decompression Techniques.	Usage
CO-5	Construct and implement efficient codes for data on imperfect communication channels.	Assessment
CO-6	Design and use the concepts Of Multimedia Communication	Assessment

List of Experiments:

S. No.	Description	Hours
1	Write a program for determination of various entropies and mutual information of a given channel. Test various types of channel such as a) Noise free channel. b) Error free channel c) Binary symmetric channel d) Noisy channel Compare channel capacity of above channels.	2
2	Write a Program to implement an algorithm for Determination of Entropy, Information, and Information Rate.	2
3	Write a program for generation and evaluation of variable length source coding using Shannon – Fano coding and decoding	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Write a program for generation and evaluation of variable length source coding using Huffman Coding and decoding	2
5	Write a Program for coding & decoding of Linear block codes.	2
6	Write a Program for coding & decoding of Cyclic codes.	2
7	Write a program for coding and decoding of Convolutional codes.	2
8	Write a program for coding and decoding of BCH codes.	2
9	Write a program for coding and decoding of RS codes.	2
10	Write a program to study performance of a coded and uncoded communication system(Calculate the error probability)	2
11	Write a simulation program to implement source coding and channel coding for transmitting a text file.	2
12	Write a program to implement adaptive Huffman coding to compress the textual data.	2
	Total Lab Hours	**28**

Suggested Books/Resources:

1. Cover, Thomas M., and Joy A. Thomas. *Elements of information theory*. John Wiley & Sons, 2012.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley And Sons, 2001.
3. Fred Halsall, "Multimedia Communications, Applications Networks Protocols And Standards", Pearson Education, Asia 2002
4. Bose, Ranjan. *Information theory, coding and cryptography*. Tata McGraw-Hill Education, 2008.
5. Mark Nelson, "Data Compression Book", BPB Publication 1992.
6. Watkinson J, "Compression in Video And Audio", Focal Press, London, 1995.
7. Link to NPTEL course contents:https://nptel.ac.in/courses/117101053/
8. Link to topics related to course:

i. http://chamilo2.grenet.fr/inp/courses/PHELMA4PMSTHI9/document/Info_Th_ChI-II-III.pdf?cidReq=PHELMA4PMSTHI9&id_session=0&gidReq=0&origin=

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
Total	100 marks	Total

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	Average
CO-1	3	3	2	2	2	2	2	1	2	3	3	1	2.2
CO-2	3	1	3	2	2	2	3	2	2	3	2	2	2.3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-3	3	3	2	1	1	3	3	3	3	3	1	1	**2.3**
CO-4	3	2	2	2	2	2	2	2	1	2	1	1	**1.8**
CO-5	3	3	2	1	2	3	3	2	1	2	2	1	**2.1**
CO-6	3	3	2	1	1	3	3	1	3	3	3	1	**2.3**
Average	**3**	**2.5**	**2.2**	**1.5**	**1.7**	**2.5**	**2.7**	**1.8**	**2**	**2.7**	**2**	**1.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Java Programming

COURSE CODE: 18B1WCI534

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Object-Oriented Systems and Programming

Course Objectives:

1. Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications
4. Designing distributed applications using Remote Method Invocation (RMI)

Course Outcomes:

S. No	Course Outcomes	Level of Attainment
CO-1	To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings	Usage
CO-2	To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.	Usage
CO-3	To learn the server side programming using Servlets and JSP.	Usage
CO-4	To learn the invocation of the remote methods in an application using RMI	Usage

Course Contents:

Unit	Contents	Lectures required
1	Applet Programming: Structure and Life Cycle of a Java Applet, Graphics, Multithreading and Animation, Abstract Windowing Toolkit, Swings and Event Handling.	8
2	Java Database Connectivity (JDBC): JDBC Product, Types of Drivers, Two- Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface.	6
3	Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP. Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page, JSP with Java Bean.	10
4	Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application.	4
Total Lectures		**28**

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2. Advanced Java Programming by Uttam K. Roy, Publisher: Oxford University Press

Suggested Reference Book(s):

1. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media

Other useful resource(s):

1 Link to NPTEL course contents:

i. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

ii. https://nptel.ac.in/courses/106105084/28

2 Link to topics related to course:

i. https://www.javatpoint.com/

ii. https://www.tutorialspoint.com/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Java Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	1	2	2	3	1	3	1	3	2.2
CO-2	3	3	2	2	1	2	1	3	2	2	3	3	2.3
CO-3	3	3	2	3	3	3	1	3	2	3	3	2	2.6
CO-4	3	3	2	3	3	3	1	3	2	3	3	2	2.6
Average	3	3	2	2.5	2	2.5	1.3	3	1.8	2.8	2.5	2.5	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Machine Learning for Data Analysis

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Introduction to Machine Learning

(20B1WEC531) Course Objectives:

1. To provide a broad survey of approaches and techniques in machine learning;
2. To develop the design and programming skills that will help you to build intelligent, adaptive artifacts.
3. To develop the basic skills necessary to pursue research in machine learning.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic theory underlying machine learning.	Familiarity
CO-2	Understand a range of machine learning algorithms along with their strengths and weaknesses.	Usage
CO-3	Apply machine learning algorithms to solve problems of moderate complexity.	Assessment
CO-4	Formulate machine learning problems corresponding to different applications.	Assessment
CO-5	Read current research papers and understand the issues raised by current research.	Usage

Unit	Contents	Lectures required
1	Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.	3
2	Data Exploration and Pre-processing: Data objects and attributes; Statistical measures, Visualization, Data cleaning and integration	4
3	Decision Tree based Learning: Decision tree induction, Attribute selection and tree pruning.	5
4	Support Vector Machines: Maximum margin linear separators, Quadractic programming solution to finding maximum margin separators, Kernels for learning non-linear functions.	5
5	Dimensionality Reduction: Discriminant analysis; Principal component analysis, Independent component analysis; Transform Domain and statistical feature extraction and reduction.	7
6	Clustering and Unsupervised Learning: Learning from unclassified data,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Clustering, Hierarchical Aglomerative Clustering, k-means clustering, Density based clustering.	
7	Artificial Neural Networks: Single layer neural network, Multilayer Perceptron, Back Propagation learning, Functional link artificial neural network, Radial basis function network, Recurrent neural networks, Convolution neural network.	10
Total lectures		42

Suggested Text Book(s):

1. J. Watt, R. Borhani and A. K. Katsaggelos: Machine Learning Refined: Foundations, Algorithms and Applications, Cambridge University Press, 1st ed., 2016.
2. C. Bishop: Pattern Recognition and Machine Learning, Springer, 1st ed., 2006.
3. J. Han, M. Kamber, J. Pei: Data Mining: Concepts and Techniques, Elsevier Amsterdam, 3rd ed., 2011

Suggested Reference Book(s):

1. T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2013.
2. H. Simon: Neural Networks and Learning Machines, Prentice Hall, 3rd ed., 2009.

Other useful resource(s):

1. H. Daume: A course in Machine Leaning, 2015. http://ciml.info/
2. Link to NPTEL course contents: Introduction to Machine Learning https://onlinecourses.nptel.ac.in/noc17_cs26/preview
3. Link to MITOPENCOURESEWARE: Machine Learning

https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (3) - 10 Quizzes (3) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Machine Learning and Data Analytics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	2	2	2	1	1	2	3	3	2.17
CO-2	3	3	3	2	3	2	2	1	1	2	3	3	2.33
CO-3	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO-4	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO-5	3	3	3	3	3	3	3	1	3	3	3	3	2.83
Average	3.00	3.00	2.80	2.60	2.80	2.60	2.60	1.00	2.20	2.60	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

MOBILE COMMUNICATION

(Elective Subject)

Course Code:	10B1WEC731	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course Objectives

1. To make students familier with fundamentals of mobile communication systems
2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems
5. As a prerequisite for the course in Wireless LANs

Course Outcomes

1. To make students familiar with various generations of mobile communications
2. To understand the concept of cellular communication
3. To understand the basics of wireless communication
4. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
5. Knowledge of IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
6. Knowledge of 3G mobile standards and their comparison with 2G technologies.
7. To under multicarrier communication systems.
8. To differentiate various Wireless LANs.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Evolution of mobile communication systems. 1G, 2G, 2.5G & 3G systems. IMT2000, FDD, TDD, FDMA, TDMA, CDMA, SDMA. Radio frequency spectrum and communication technology. Block diagram of mobile communication system. Problems of mobile communication: spectrum, propagation. Near far problem.	T S Rapaport: Pages 1-39, Jochen Schiller: Pages 7-15	4
2.	The cellular Concept – Introduction, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trucking and grade of services, Improving coverage & capacity in cellular system	T S Rapaport: Pages 57-93	6
3.	GSM standards and architecture, GSM Radio aspects, typical call flow sequences in GSM, security aspects. GPRS	Jochen Schiller: Pages 96- 120 Raymond Steel: 65-147	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

4.	CDMA standards: Spread spectrum, direct sequence and frequency hop spread spectrum, IS-95 CDMA architecture, forward link and reverse link,cdma2000	Raymond Steel: 205-281 T S Rapaport: Pages 569- 582	8
5.	WCDMA: Frame structure, UTRA FDD, UTRA TDD, UMTS, architecture	Jochen Schiller: 136-155	4
6.	Introduction to WLAN: Infrastructure based and adhoc networks, IEEE 802.11, IEEE 802.11a, IEEE 802.11b. Bluetooth, WiMAX	Jochen Schiller: 201-238, 269-290	8
7.	4G Systems: Introduction to OFDM and MC-CDMA	L. Hanzo, T. Keller: 1-18, 203-217	6
		Total Number of Lectures	**44**

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1) T. S. Rappaport, Wireless Communications, PHI, 2002.

2) Mobile Communication, Jochen Schiller, Pearson.

Reference Books

1) WilliamC.Y.Lee,MobileCellularTelecommunications-Analog&DigitalSystems, Mc.Graw Hill,1995

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology, Waknaghat

Department of CSE & IT

MOBILE COMPUTING

(Proposed Course Plan)

Course Coordinator:

Nishtha Ahuja
Department of Computer Science & Engineering

Course Information

Credit: 3-0-0 (L-P-T)

Semester: Even, Session: Jul – Dec 2015

Class: BTech (CSE), VII Sem

Total lectures: 42

Pre-requisites: Java Programming, Computer Networks, Operating Systems

Course Objective

Mobile Phones have emerged as truly pervasive and affordable information and communication technology platform in the last decade. So there is a growing need for a course which can teach students the skills needed to program and configure mobile devices and networks, enabling them to develop new and exciting applications for existing and emerging hardware technology. The objective of the course is to equip students on the fundamentals of mobile computing and the design mobile services. Learn the issues in mobile computing and communications from the hard- ware and software perspective. Understand the mobile IP stack and mobile web access, technologies and services.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assessment

- Internal Assessment

Quiz	10Marks
Project	10Marks
Assignment	5Marks

- Mid Term 30Marks
- End Term 45Marks

Total	**100 Marks**

Course Outcomes:

CO-1: Introduce enabling technologies of pervasive computing.

CO-2: Acquire solid knowledge on mobile networks and mobile computing.

CO-3: Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.

CO-4: Understand the concepts of Adhoc and wireless sensor networks.

CO-5: Understand the concepts of Mobile IP.

CO-6: To be able to analyze the performance of different handoff, roaming, and location update algorithms for cellular networks.

CO-7: Awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior.

CO-8: Describe the possible future of mobile computing technologies and applications.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

B.Tech CSE Programme Objectives (POs)

A graduate of the Computer Science and Engineering Program will demonstrate

PO-1: A strong foundation in core Computer Science and Engineering, both theoretical and applied concepts.

PO-2: An ability to apply knowledge of mathematics, science, and engineering to real-life problems.

PO-3: Ability to model, understand and develop complex software and information management systems.

PO-4: An ability to function effectively within teams.

PO-5: An understanding of professional and ethical responsibility.

PO-6: An ability to communicate effectively, both in writing and oral.

PO-7: The broad education necessary to understand the impact of Computer Science and Engineering solutions in the societal and human context.

PO-8: A recognition of the need for, and an ability to engage in life-long learning.

PO-9: A knowledge of contemporary issues.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Correlation of COs to POs

Course Outcomes	Level of Attainment	Programme Educational Objectives									Assessment (%)
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	Familiarity	H	M	H	M	M	H	H	H	H	89
CO2	Familiarity	H	H	H	M	M	H	H	H	H	92
CO3	Usage	H	H	H	H	H	H	H	H	H	100
CO4	Assessment	H	H	H	M	H	H	H	H	H	96
CO5	Assessment	H	H	H	H	M	H	H	H	M	92
CO6	Assessment	M	H	H	H	H	M	H	H	H	92
CO7	Familiarity	H	M	M	H	H	H	H	H	M	89
CO8	Familiarity	H	M	M	M	M	H	H	H	H	85
Assessment (%)		95	87	91	71	84	95	100	100	91	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Lecture Plan:

S.No.	Chapter	Lectures	Chapter
1.	Introduction to Ubiquitous Computing	1	
2.	Introduction to Android Operating system • Introduction to the emerging technology • Architecture • Installation Setup • The Activity Class • The Intent Class • Permissions • Creating the UI • Storing and Retrieving Data • User Notifications • Broadcast Receivers • Networking • Location and maps • Sensors	9	Book 1 1 1 2 2 2 3,4 6 8 8 9 9
3.	Introduction to Windows Operating Systems • Architecture • Installation Setup • Introduction to XAML • Understanding the Navigation Model • Understanding the apps lifecycle and managing states • Building UI • Sensors • Storing and Retrieving data	9	Book 2 1 2 2 3 6 10
4.	Mid Sem project demo	1	
5.	WiFi • Physical Layer • Channel Coding • How the physical layer works • Link Layer MAC Protocols • Link Adaption Protocols • Energy Efficiency in WiFi • Cellular Systems	6	Book 3 Chapter 6 and topic 7.4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6.	Mobile IP • Mobility in Network Layer • Internet protocols for Mobile Applications • Single Hop Mobility • Mobile IP and Issues • Handoff Issues	4	Book 3 Chapter 1, 2
7.	Routing • Routing Protocols in MultiHop Networks • MultiHop routing metrics	3	Reference 4
8.	MANET	2	
9.	Student presentations on Emerging New Technologies in Mobile Computing Area	4-5	
10.	End Sem Project Demo	2	
	Total	**42**	

References:

Textbooks:

[1] W. Lee and K. Mittal, Beginning Android application development. Indianapolis, Ind.: Wiley Pub., 2011.

[2]A. Whitechapel and S. McKenna, Windows Phone 8 development internals. Redmond, Wash.: Microsoft Press, 2012.

[3]I. Stojmenovic, Handbook of Wireless Networks and Mobile Computing. Hoboken, NJ: John Wiley & Sons, 2002.

[4] Dr.S.S.Dhenakaran, A.Parvathavarthini (2013) 'An Overview of Routing Protocols in Mobile Ad-Hoc Network', International Journal of Advanced Research in Computer Science and Software Engineering, 3(2), pp. [Online]. Available at: www.ijarcsse.com

Reference Books:

[1] R. Meier, Professional Android application development. Indianapolis, IN: Wiley, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

[2] Microsoft Open Technologies, Inc., Windows Phone 8 Guide for Android Application Developers.

[3] Stalling, William, 2002. *Wireless Communications and Networks*. 2nd ed. Upper Saddle River, NJ 07458: Pearson

---

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

Peptide Therapeutics

COURSE CODE: 18B1WBT631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: General Chemistry

Course Objectives:

1. To develop an understanding of important concepts and design aspects of peptides
2. To learn various therapeutic applications of peptides.
3. Apply basic knowledge to design peptides for various therapeutic purposes

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand various peptide design consideration and other important structural aspects of peptides	Familiarity
CO-2	Able to understand and learn the concept of solid phase peptides synthesis	Familiarity
CO-3	To develop methods of peptides and proteins for their quality control and apply them in handling Therapeutic peptides and proteins	Assessment
CO-4	To understand the mechanism of action of Antibiotic, Anticancer, Antihypertensive and Opioid peptides	Usage
CO-5	To develop a strong foundation therapeutic peptide design and their applications	Usage

Course Contents:

Unit	Contents	Lectures required
1	Peptides, synthetic peptides & their classification based on structure, engineering bioactive peptide based therapeutic molecules,	7
2	Principle and practice of solid phase peptide synthesis, solid support, protection scheme, peptide acid and amide, Purification of peptides, quality control of peptides	7
3	Antimicrobial host defense peptides, Anticancer peptides, Opioid Peptides, Antihypertensive Peptides, Peptides in clinical trial ,chemical biology of Oxytocin, valinomycin and enkephalins	18
4	Preformulationstudies, Formulation development, Aggregation in protein formulation, novel formulation approaches, Lyophilization, Pharmaceutical Processing, and Handling of Therapeutic Peptides and Proteins	6
5	Circular dichroism, UV, IR, Mass and fluorescence spectroscopy of peptides	4
	Total lecture	42

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Ajay K Banga, "Therapeutic peptides and protein: formulation processing and delivery system, Second edition, Taylor and Francis.
2. Lehninger Principles of Biochemistry Cox, M.M. and Nelson, D.L. and Lehninger A. L. 4th edition.
3. Biochemistry- J.M. Berg, J.L.Tymoczko, and LubertStryer; 5th edition W.H. Freeman and Company, New York, USA.

Suggested Reference Book(s):

1. Gregory A. Grant, "Synthetic peptides A Users Guide" 2nd ed. W. H. Freeman and Company

EvaluationScheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Peptide Therapeutics	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	1	-	-	2	3	3	3	1.92
CO-2	2	3	3	3	2	2	-	-	2	3	3	3	2.17
CO-3	3	3	3	3	3	2	-	-	2	3	3	3	2.33
CO-4	3	3	2	3	3	2	-	-	2	3	3	3	2.25
CO-5	3	3	2	3	2	2	-	-	2	3	3	3	2.17
Average	2.60	3.00	2.40	2.80	2.40	1.80	0.00	0.00	2.00	3.00	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Principles of Programming Languages Lab

COURSE CODE: XXXXXXXX

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Learn syntax, semantics and create Functions in Principles of Programming Languages.
2. Recite the high points of programming language history.
3. Read the central formalisms used in the description of programming languages.
4. Assess programming languages critically and in a scientific manner;
5. Analyze the principles of an imperative, functional, object oriented or logic oriented programming language.

Course Outcomes:

S. NO	Course Outcomes	Level of Attainment
CO-1	To learn major programming paradigms and techniques involved in design and implementation of modern programming languages. To learn the structure of a compiler and interpretation. To learn syntax and semantic of programming language.	Familiarity
CO-2	To learn the structured and object oriented programming paradigm.	Familiarity
CO-3	To different programming paradigm to improving the clarity, quality, and development time of a program (structured programming). To learn Haskell (an advanced purely-functional programming style and lambda calculus (for variable binding and substitution).	Assessment
CO-4	To learn the concurrency in programming languages, Exception handling and Scripting languages	Familiarity

List of Experiments:

S. No	Description	Hours
1	1. To understand the value of records in a programming language, write a small program in a C-based language that uses an array of structs that store student information, including name, age, GPA as a float, and grade level as a string (e.g., "freshmen," etc.). Also, write the same program in the same language without using structs. 2. To understand the value of recursion in a programming language, write a program that implements quicksort, first using recursion and then without recursion.	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**1.** Write a BNF description of the Boolean expressions of Java, including the three operators && || and ! and the relational expressions.
	2. Prove the following program is correct:
	a. {n > 0}
	b. count = n;
	c. sum = 0;
	d. while
	e. count <> 0
	f. do
	g. sum = sum + count;
	h. count = count - 1;
	i. end
	j. {sum = 1 + 2 + ...+ n}
		2

3	**1.** Implement and test the LR parsing algorithm [Hint Section 4.5.3 page 214 book concepts-of-programming-languages]	2
4	**1.** Write a C function that includes the following sequence of statements: *x = 21;* *int x;* *x = 42;* Run the program and explain the results. Rewrite the same code in C++ and Java and compare the results. **2.** Write three functions in C or C++: one that declares a large array statically, one that declares the same large array on the stack, and one that creates the same large array from the heap. Call each of the subprograms a large number of times (at least 100,000) and output the time required by each. Explain the results	2
5	**1.** Write a program in the language of your choice that behaves differently if the language used name equivalence than if it used structural equivalence.. **2.** Write a Java program that exposes Java's rule for operand evaluation order when one of the operands is a method call.	2
6	**1.** Rewrite the following code segment using a multiple-selection statement in the following languages: *if* *((k == 1) || (k == 2)) j = 2 * k - 1* *if* *((k == 3) || (k == 5)) j = 3 * k + 1* *if* *(k == 4) j = 4 * k - 1* *if* *((k == 6) || (k == 7) || (k == 8)) j = k – 2* *a. Fortran 95 (you'll probably need to look this one up)* *b. Ada* *c. C, C++, Java, or C#* *d. Python* *e. Ruby* Assume all variables are integer type. Discuss the relative merits of the use of these languages for this particular code.	2
7	**1.** Write a Perl program that passes by reference a literal to a subprogram, which attempts to change the parameter. Given the	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	overall design philosophy of Perl, explain the results. **2.** Write a program in some language that has both static and stack dynamic local variables in subprograms. Create six large (at least 100*100) matrices in the subprogram three static and three stack dynamic. Fill two of the static matrices and two of the stack-dynamic matrices with random numbers in the range of 1 to 100. The code in the subprogram must perform a large number of matrix multiplication operations on the static matrices and time the process. Then it must repeat this with the stack-dynamic matrices. Compare and explain the results **3.** Write a generic Ada function that takes an array of generic elements and a scalar of the same type as the array elements. The type of the array elements and the scalar is the generic parameter. The subscripts of the array are positive integers. The function must search the given array for the given scalar and return the subscript of the scalar in the array. If the scalar is not in the array, the function must return −1 . Instantiate the function for Integer and Float types and test both.	
8	**1.** Write a program that includes two subprograms, one that takes a single parameter and performs some simple operation on that parameter and one that takes 20 parameters and uses all of the parameters, but only for one simple operation. The main program must call these two subprograms a large number of times. Include in the program timing code to output the run time of the calls to each of the two subprograms. Run the program on a RISC machine and on a CISC machine and compare the ratios of the time required by the two subprograms. Based on the results, what can you say about the speed of parameter passing on the two machines?	2
9	**1.** Write an abstract data type for queues whose elements store 10-character names. The queue elements must be dynamically allocated from the heap. Queue operations are enqueue, dequeue, and empty. Use either Ada, C++, Java, C#, or Ruby. **2.** Write an abstract data type for rational numbers (a numerator and a denominator). Include a constructor and methods for getting the numerator, getting the denominator, addition, subtraction, multiplication, division, equality testing, and display. Use Java, C#, C++, Ada, or Ruby.	2
10	**1.** Design and implement a C++ program that defines a base class A, which has a subclass B, which itself has a subclass C. The A class must implement a method, which is overridden in both B and C. You must also write a test class that instantiates A, B, and C and includes three calls to the method. One of the calls must be statically bound to A's method. One call must be dynamically bound to B's method, and one must be dynamically bound to C's method. All of the method calls must be through a pointer to class A. **2.** The reader-writer problem can be stated as follows: A shared memory location can be concurrently read by any number of tasks, but when a task must write to the shared memory location, it must have exclusive access. Write a Java program for the reader-writer problem.	2
11	**1.** Write a Java program that inputs a list of integer values in the range of - 100 to 100 from the keyboard and computes the sum of the squares of the input values. This program must use exception handling to ensure that the input values are in range and are legal	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	integers, to handle the error of the sum of the squares becoming larger than a standard Integer variable can store, and to detect end-of-file and use it to cause the output of the result. In the case of overflow of the sum, an error message must be printed and the program terminated.	
12	1. Write a Scheme function that computes the real roots of a given quadratic equation. If the roots are complex, the function must display a message indicating that. This function must use an *IF* function. The three parameters to the function are the three coefficients of the qua dratic equation.	2
13	1. Write a Scheme function that takes a list as a parameter and returns a list identical to the parameter list except with the second top-level element removed. If the given list does not have two elements, the function should return (). Rewrite the following Scheme function as a tail-recursive function: *(DEFINE (doit n)* *(IF (= n 0)* *0* *(+ n (doit (− n 1)))* *))*	2
14	1. Using the structures *parent(X, Y)* , *male(X)* , and *female(X)* , write a structure that defines *mother(X, Y)* 2. Write a Prolog program that succeeds if the intersection of two given list parameters is empty. 3. Write a Prolog program that implements quicksort.	2
Total Lab Hours		**28**

Suggested Books/Resources:

1. https://cs444pnu1.files.wordpress.com/2014/02/concepts-of-programming-languages-10th-sebesta.pdf
2. Principles of Programming Languages: Design, Evaluation, and Implementation 3rd Edition by Bruce J. MacLennan
3. Programming Languages: Concepts & Constructs, 2nd Edition by Ravi Sethi; Pearson Education Asia
4. Programming Language Principles and Paradigms 2nd Edition, Tucker, Allen B. Michael and Noonan Robert E. , TMH 2007
5. Programming Languages and Paradigms, D. A. Watt., Prentice-Hall,1990
6. Essentials of Programming Languages, Daniel Friedman, Mitchell Wand, and Christopher Haynes, MIT Press (Indian edition - Prentice Hall, India)
7. Concepts of Programming Languages, Robert W. Sebesta, Pearson Education Asia
8. https://nptel.ac.in/courses/106102067/
9. https://www.cs.bgu.ac.il/~ppl162/Assignments

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	1	2	3	2	2	1	1	1	3	**2**
CO-2	3	2	3	1	1	3	2	3	2	1	1	3	**2.1**
CO-3	3	2	3	1	1	2	2	2	1	1	1	3	**1.8**
CO-4	3	2	3	2	2	3	2	2	1	1	1	3	**2.1**
Average	**3**	**2**	**3**	**1.3**	**1.5**	**2.8**	**2**	**2.3**	**1.3**	**1**	**1**	**3**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Principles of Programming Languages Lab

COURSE CODE: XXXXXXXX

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Learn syntax, semantics and create Functions in Principles of Programming Languages.
2. Recite the high points of programming language history.
3. Read the central formalisms used in the description of programming languages.
4. Assess programming languages critically and in a scientific manner;
5. Analyze the principles of an imperative, functional, object oriented or logic oriented programming language.

Course Outcomes:

S. NO	Course Outcomes	Level of Attainment
CO-1	To learn major programming paradigms and techniques involved in design and implementation of modern programming languages. To learn the structure of a compiler and interpretation. To learn syntax and semantic of programming language.	Familiarity
CO-2	To learn the structured and object oriented programming paradigm.	Familiarity
CO-3	To different programming paradigm to improving the clarity, quality, and development time of a program (structured programming). To learn Haskell (an advanced purely-functional programming style and lambda calculus (for variable binding and substitution).	Assessment
CO-4	To learn the concurrency in programming languages, Exception handling and Scripting languages	Familiarity

List of Experiments:

S. No	Description	Hours
1	1. To understand the value of records in a programming language, write a small program in a C-based language that uses an array of structs that store student information, including name, age, GPA as a float, and grade level as a string (e.g., "freshmen," etc.). Also, write the same program in the same language without using structs. 2. To understand the value of recursion in a programming language, write a program that implements quicksort, first using recursion and then without recursion.	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**1.** Write a BNF description of the Boolean expressions of Java, including the three operators && || and ! and the relational expressions.
	2. Prove the following program is correct:
	a. {n > 0}
	b. count = n;
	c. sum = 0;
	d. while
	e. count <> 0
	f. do
	g. sum = sum + count;
	h. count = count - 1;
	i. end
	j. {sum = 1 + 2 + ...+ n}
		2

3	**1.** Implement and test the LR parsing algorithm [Hint Section 4.5.3 page 214 book concepts-of-programming-languages]	2
4	**1.** Write a C function that includes the following sequence of statements: *x = 21;* *int x;* *x = 42;* Run the program and explain the results. Rewrite the same code in C++ and Java and compare the results. **2.** Write three functions in C or C++: one that declares a large array statically, one that declares the same large array on the stack, and one that creates the same large array from the heap. Call each of the subprograms a large number of times (at least 100,000) and output the time required by each. Explain the results	2
5	**1.** Write a program in the language of your choice that behaves differently if the language used name equivalence than if it used structural equivalence.. **2.** Write a Java program that exposes Java's rule for operand evaluation order when one of the operands is a method call.	2
6	**1.** Rewrite the following code segment using a multiple-selection statement in the following languages: *if* *((k == 1) || (k == 2)) j = 2 * k - 1* *if* *((k == 3) || (k == 5)) j = 3 * k + 1* *if* *(k == 4) j = 4 * k - 1* *if* *((k == 6) || (k == 7) || (k == 8)) j = k – 2* *a. Fortran 95 (you'll probably need to look this one up)* *b. Ada* *c. C, C++, Java, or C#* *d. Python* *e. Ruby* Assume all variables are integer type. Discuss the relative merits of the use of these languages for this particular code.	2
7	**1.** Write a Perl program that passes by reference a literal to a subprogram, which attempts to change the parameter. Given the	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	overall design philosophy of Perl, explain the results. 2. Write a program in some language that has both static and stack dynamic local variables in subprograms. Create six large (at least 100*100) matrices in the subprogram three static and three stack dynamic. Fill two of the static matrices and two of the stack-dynamic matrices with random numbers in the range of 1 to 100. The code in the subprogram must perform a large number of matrix multiplication operations on the static matrices and time the process. Then it must repeat this with the stack-dynamic matrices. Compare and explain the results 3. Write a generic Ada function that takes an array of generic elements and a scalar of the same type as the array elements. The type of the array elements and the scalar is the generic parameter. The subscripts of the array are positive integers. The function must search the given array for the given scalar and return the subscript of the scalar in the array. If the scalar is not in the array, the function must return –1 . Instantiate the function for Integer and Float types and test both.	
8	1. Write a program that includes two subprograms, one that takes a single parameter and performs some simple operation on that parameter and one that takes 20 parameters and uses all of the parameters, but only for one simple operation. The main program must call these two subprograms a large number of times. Include in the program timing code to output the run time of the calls to each of the two subprograms. Run the program on a RISC machine and on a CISC machine and compare the ratios of the time required by the two subprograms. Based on the results, what can you say about the speed of parameter passing on the two machines?	2
9	1. Write an abstract data type for queues whose elements store 10-character names. The queue elements must be dynamically allocated from the heap. Queue operations are enqueue, dequeue, and empty. Use either Ada, C++, Java, C#, or Ruby. 2. Write an abstract data type for rational numbers (a numerator and a denominator). Include a constructor and methods for getting the numerator, getting the denominator, addition, subtraction, multiplication, division, equality testing, and display. Use Java, C#, C++, Ada, or Ruby.	2
10	1. Design and implement a C++ program that defines a base class A, which has a subclass B, which itself has a subclass C. The A class must implement a method, which is overridden in both B and C. You must also write a test class that instantiates A, B, and C and includes three calls to the method. One of the calls must be statically bound to A's method. One call must be dynamically bound to B's method, and one must be dynamically bound to C's method. All of the method calls must be through a pointer to class A. 2. The reader-writer problem can be stated as follows: A shared memory location can be concurrently read by any number of tasks, but when a task must write to the shared memory location, it must have exclusive access. Write a Java program for the reader-writer problem.	2
11	1. Write a Java program that inputs a list of integer values in the range of - 100 to 100 from the keyboard and computes the sum of the squares of the input values. This program must use exception handling to ensure that the input values are in range and are legal	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	integers, to handle the error of the sum of the squares becoming larger than a standard Integer variable can store, and to detect end-of-file and use it to cause the output of the result. In the case of overflow of the sum, an error message must be printed and the program terminated.	
12	1. Write a Scheme function that computes the real roots of a given quadratic equation. If the roots are complex, the function must display a message indicating that. This function must use an *IF* function. The three parameters to the function are the three coefficients of the qua dratic equation.	2
13	1. Write a Scheme function that takes a list as a parameter and returns a list identical to the parameter list except with the second top-level element removed. If the given list does not have two elements, the function should return (). Rewrite the following Scheme function as a tail-recursive function: *(DEFINE (doit n)* *(IF (= n 0)* *0* *(+ n (doit (− n 1)))* *))*	2
14	1. Using the structures *parent(X, Y)* , *male(X)* , and *female(X)* , write a structure that defines *mother(X, Y)* 2. Write a Prolog program that succeeds if the intersection of two given list parameters is empty. 3. Write a Prolog program that implements quicksort.	2
Total Lab Hours		**28**

Suggested Books/Resources:

1. https://cs444pnu1.files.wordpress.com/2014/02/concepts-of-programming-languages-10th-sebesta.pdf
2. Principles of Programming Languages: Design, Evaluation, and Implementation 3rd Edition by Bruce J. MacLennan
3. Programming Languages: Concepts & Constructs, 2nd Edition by Ravi Sethi; Pearson Education Asia
4. Programming Language Principles and Paradigms 2nd Edition, Tucker, Allen B. Michael and Noonan Robert E. , TMH 2007
5. Programming Languages and Paradigms, D. A. Watt., Prentice-Hall,1990
6. Essentials of Programming Languages, Daniel Friedman, Mitchell Wand, and Christopher Haynes, MIT Press (Indian edition - Prentice Hall, India)
7. Concepts of Programming Languages, Robert W. Sebesta, Pearson Education Asia
8. https://nptel.ac.in/courses/106102067/
9. https://www.cs.bgu.ac.il/~ppl162/Assignments

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	1	2	3	2	2	1	1	1	3	2
CO-2	3	2	3	1	1	3	2	3	2	1	1	3	2.1
CO-3	3	2	3	1	1	2	2	2	1	1	1	3	1.8
CO-4	3	2	3	2	2	3	2	2	1	1	1	3	2.1
Average	**3**	**2**	**3**	**1.3**	**1.5**	**2.8**	**2**	**2.3**	**1.3**	**1**	**1**	**3**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Description

Course Name:	Introduction to Python Programming
Course Code:	18B1WCI731
Total Course Credits:	3 (L=3)
Course Type:	Elective
Branch and Semester:	B.Tech (CSE/IT) VII Semester
Session:	July–Dec 2019
Instructors:	Dr. Shailendra Shukla

Scope and Objectives of the Course

The aim of this subject is to provide students with an understanding of the role computation can play in solving problems. The course covers the fundamental principles of Object-Oriented Programming and information processing techniques through Python programs. Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications.

Broad Learning Outcomes

- Provide an understanding of the role computation can play in solving problems.
- Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
- Position students so that they can compete for research projects and excel in subjects with programming components.

Prerequisites: None

Teaching Methodology

The class will combine lectures and labs. Lectures will focus on learning the concepts and principles, and in lab sessions students will have to work individually as well as in groups who will jointly be assigned combined tasks on related problems. Focus will be on problems in the application domain of other courses being studied by the students. Overall the course will adopt a problem-solving approach using Python language. The expectation is that students will become self-sufficient in learning any programming language on their own thereafter. The topics will be discussed in an integrated manner following the principles of problem based learning.

Tools and Techniques

- You will be using the Python programming language, version 3.5.
- You are not expected to have any prior programming knowledge - this course is intended for students who have little to no experience with any programming language.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outlines:

S.No.	Topics	Sub-Topics	Lectures (Hours)
1	Informal introduction to Python programming language:	• What is a program? • What is debugging? • Formal and natural languages • Downloading and installing Python. The first program • Debugging	2
2	Variables, expressions and Functions in Python	• Values and types • Variables • Variable names and keywords • Operators and operands • Expressions and statements • Interactive mode and script mode • Order of operations • String operations • Function calls • Type conversion functions • Math functions • Composition • Adding new functions • Definitions and uses • Flow of execution • Parameters and arguments	2
3	Branching and Iteration	• Loops • Multiple assignment • Updating variables • The while statement • Break • Continue	2
4	String Manipulation, Guess and Check, Approximations, Bisection	• String manipulation • Guess and check algorithms(e.g: find Square Root etc) • Approximate solutions(e.g Successive approximation) • Bisection method	3
5	Decomposition, Abstractions.	• divide and conquer (modules) • Abstraction	3
6	Tuples, Lists, Dictionaries, Illustrative programs	• Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		parameters; • Tuples: tuple assignment, tuple as return value; • Dictionaries: operations and methods; advanced list processing – list comprehension; • Illustrative programs: selection sort, insertion sort, mergesort, histogram	
7	Files, Modules, Packages	• Files and exception: text files, reading and writing files, format operator • Packages • Illustrative programs: word count, copy file.	3
8	Testing, Debugging, Exceptions, Assertions	• Unit testing framework(unittest) • debugger for Python program(pdb) • Handling an exception	2
9	Object Oriented Programming	• Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects • OOP, continued: inheritance, polymorphism, operator overloading, abstract classes	8
10	Multithreading	• Thread • Starting a thread • Threading module • Synchronizing threads • Multithreaded Priority Queue	3
11	Illustrative programs(examples)	• Sorting and Searching • Regular expressions o Match function o Search function o Matching vs Searching o Modifiers o Patterns • Networking o Socket o Socket Module o Methods o Client and server o Internet modules	8
12	GUI Programming	• Introduction • Tkinter programming	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	ng • Tkinter widgets	
Total Lectures		42

Evaluation Scheme

Assessment Scheme	Marks
*Test-I	15
#Test-II	25
$Test-III	35
~Internal Assessment (Continuous Evaluation) [Assignments, Surprise/Announced Quizzes and Attendance]	25
Total	100

Reference Books

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Web References

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm
2. https://docs.python.org/3/tutorial/index.html
3. https://www.w3schools.com/python/default.asp

Course Coordinators Contact Information:

xxxxxxxxxx
Department of CSE and IT
Jaypee University of Information Technology
Waknaghat, Solan-173234, Himachal Pradesh, INDIA

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Description

Course Name:	Introduction to Python Programming
Course Code:	18B1WCI731
Total Course Credits:	3 (L=3)
Course Type:	Elective
Branch and Semester:	B.Tech (CSE/IT) VII Semester
Session:	July–Dec 2019
Instructors:	Dr. Shailendra Shukla

Scope and Objectives of the Course

The aim of this subject is to provide students with an understanding of the role computation can play in solving problems. The course covers the fundamental principles of Object-Oriented Programming and information processing techniques through Python programs. Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications.

Broad Learning Outcomes

- Provide an understanding of the role computation can play in solving problems.
- Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
- Position students so that they can compete for research projects and excel in subjects with programming components.

Prerequisites: None

Teaching Methodology

The class will combine lectures and labs. Lectures will focus on learning the concepts and principles, and in lab sessions students will have to work individually as well as in groups who will jointly be assigned combined tasks on related problems. Focus will be on problems in the application domain of other courses being studied by the students. Overall the course will adopt a problem-solving approach using Python language. The expectation is that students will become self-sufficient in learning any programming language on their own thereafter. The topics will be discussed in an integrated manner following the principles of problem based learning.

Tools and Techniques

- You will be using the Python programming language, version 3.5.
- You are not expected to have any prior programming knowledge - this course is intended for students who have little to no experience with any programming language.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Course Outlines:

S.No.	Topics	Sub-Topics	Lectures (Hours)
1	Informal introduction to Python programming language:	• What is a program? • What is debugging? • Formal and natural languages • Downloading and installing Python. The first program • Debugging	2
2	Variables, expressions and Functions in Python	• Values and types • Variables • Variable names and keywords • Operators and operands • Expressions and statements • Interactive mode and script mode • Order of operations • String operations • Function calls • Type conversion functions • Math functions • Composition • Adding new functions • Definitions and uses • Flow of execution • Parameters and arguments	2
3	Branching and Iteration	• Loops • Multiple assignment • Updating variables • The while statement • Break • Continue	2
4	String Manipulation, Guess and Check, Approximations, Bisection	• String manipulation • Guess and check algorithms(e.g: find Square Root etc) • Approximate solutions(e.g Successive approximation) • Bisection method	3
5	Decomposition, Abstractions.	• divide and conquer (modules) • Abstraction	3
6	Tuples, Lists, Dictionaries, Illustrative programs	• Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
JUIT
NAAC

		parameters; • Tuples: tuple assignment, tuple as return value; • Dictionaries: operations and methods; advanced list processing – list comprehension; • Illustrative programs: selection sort, insertion sort, mergesort, histogram	
7	Files, Modules, Packages	• Files and exception: text files, reading and writing files, format operator • Packages • Illustrative programs: word count, copy file.	3
8	Testing, Debugging, Exceptions, Assertions	• Unit testing framework(unittest) • debugger for Python program(pdb) • Handling an exception	2
9	Object Oriented Programming	• Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects • OOP, continued: inheritance, polymorphism, operator overloading, abstract classes	8
10	Multithreading	• Thread • Starting a thread • Threading module • Synchronizing threads • Multithreaded Priority Queue	3
11	Illustrative programs(examples)	• Sorting and Searching • Regular expressions o Match function o Search function o Matching vs Searching o Modifiers o Patterns • Networking o Socket o Socket Module o Methods o Client and server o Internet modules	8
12	GUI Programming	• Introduction • Tkinter programmi	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

ng • Tkinter widgets	
Total Lectures	42

Evaluation Scheme

Assessment Scheme	Marks
*Test-I	15
#Test-II	25
$Test-III	35
¯Internal Assessment (Continuous Evaluation) [Assignments, Surprise/Announced Quizzes and Attendance]	25
Total	100

Reference Books

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Web References

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm
2. https://docs.python.org/3/tutorial/index.html
3. https://www.w3schools.com/python/default.asp

Course Coordinators Contact Information:

xxxxxxxxxx
Department of CSE and IT
Jaypee University of Information Technology
Waknaghat, Solan-173234, Himachal Pradesh, INDIA

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Quality Management

COURSE CODE: 18B1WHS631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Understand the importance of quality in an organisation's success.
2. Learn to define quality of products and services in operational terms using standard parameters.
3. Learn various techniques and principles such as quality function deployment, Taguchi method, service quality management, quality audits and Six Sigma used in quality creation and maintenance.
4. Apply the techniques and principles in organizational settings.
5. Synthesise the knowledge gained on quality management to design appropriate quality systems in organizations.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.	Familiarity
CO-2	Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.	Assessment
CO-3	Critically appraise the organisational, communication and teamwork requirements for effective quality management	Usage
CO-4	Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans	Usage

Course Contents

Unit	Contents	Lectures required
1	**The Engineer and QM Link** Introduction The engineer as a specialist The failure of engineering: educational systems: The UK experience The new breed of engineers Engineers' competences and the role of QM The evolution of engineers for Total Quality Management The engineer in a QM environment	2
2	**Pioneers of QM:** How old is the quality concept? Why are the Japanese leading the field of quality? How the West has woken up to the importance of quality WE Deming ,Joseph M Juran , Philip B Crosby , Armand V Feingenbaum ,Bill Conway ,Kaoru Ishikawa, Genichi Taguchi , Shigeo Shingo, W G Ouchi	3
3	**Total Preventative Maintenance for QM** Introduction What is quality? Some quality characteristics The quality processes What is meant by Quality Control? What is meant by Statistical Quality Control? What is meant by Total Quality Control? What is meant by Quality Assurance? What is meant by Quality Management? Some examples of QM models : QM - a boardroom place QM and productivity QM and Advanced M a n u f a c t u r i n g Technology	3

Approved in Academic Council held on 29.11.2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	**The meaning of quality systems:** Why are Quality Assurance s ys t e ms needed? The role of quality standards. The different stages of a quality assurance system. The implementation of quality systems. The ISO 9000 quality system British Standard BS 5750/IS0 9000. Registration a n d accreditation in quality systems	4
5	**QM: Tools and Techniques:** Introduction . Why use tools and techniques in QM? How do we define processes? Process variation and its causes . What are the tools and techniques for QM? Process capability. The implementation of Statistical Process Control	4
6	**Total Preventive Maintenance:** Introduction, What is TPM? Failure patterns. Costs and benefits of TPM Some examples of TPM implementation Towards Zero Defect: Zero Breakdown Implementing TPM: Some guidelines	3
7	**Continuous Process Improvement:** Juran Trilogy, Improvement Strategies , Types of Problems, The PDCA cycle, Problem solving Methods, Kaizen, Reengineering	4
8	**Leadership And Strategic Planning:** Leadership theory and practices, Creating the leadership system, Strategic Planning, leadership, strategy and organization structure, leadership for Quality ; The Seven Management And Planning tools.	4
9	**Essentials of QM:** Introduction Internal customer-supplier chains External customer - supplier chains From customer satisfaction to customer commitment- from a win-lose to a win-win situation Towards single sourcing supplier chains The power of communications in customer-supplier chains.	3
10	**Principles of Six Sigma:** The statistical basis of Six Sigma ; Six Sigma Problem Solving (The DMAIC Methodology); Tools and Techniques; Design for Six Sigma Six sigma in services and small organizations Six Sigma and Lean Production Lean Six sigma and Services	3
11	**Benchmarking:** Define benchmarking, Reasons to benchmark Process, Deciding what to Benchmark, Pitfalls and criticism of Benchmarking	5
Total Lectures		42

Suggested Text Book(s):

1. Evans's. James, Lindsay M. William , The Management and Control of Quality, 8th Edition, Cengage Learning, 2011
2. Dale H. Besterfield, Total quality Management, Pearson Education, 2011

Suggested Reference Book(s):

1. H. Lal, Lt. Gen , Total Quality Management , Wiley Eastern Limited, 1990 ,
2. Bounds Greg , Beyond Total Quality Management, McGraw Hill,
3. Kanishka Bedi, Quality Management, Oxford Higher Education,

Other useful resource(s):

1. www.evans.swlearning.com
2. www.cengage.com/international

Evaluation Scheme:

S.No.	Exam	Marks	Duration	Coverage / Scope of Examination
1.	Test 1	15	1 Hour	Syllabus covered upto T-1
2.	Test 2	25	1.5 Hour	Syllabus covered upto T-2

Approved in Academic Council held on 29.11.2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Social and Information Network Analysis

COURSE CODE: XXXXX
COURSE CREDIT: 2
CORE/ELECTIVE: ELECTIVE
L-T-P: 2-0-0

Pre-requisites: Graph Theory, Probability

Course Objectives:

1. To analyze the large networks on models and algorithms that abstract their basic properties.
2. To explore how to practically analyze large-scale network data and how to reason it through models for network structure and evolution
3. To do the friend prediction in online social networks
4. To identify the functional modules in biological networks and disease outbreak detection.

Course outcomes:

S.NO	Course Outcomes	Level of Attainment
CO-1.	Understand what constitutes a social network	Familiarity
CO-2.	Represent networks in graph-theoretic language	Assessment
CO-3.	Design effective and reliable network research projects	Assessment
CO-4.	Configure network and attribute data for standard software packages	Assessment
CO-5.	Comprehend the reasons for using, and principles of, permutation tests	Assessment
CO-6.	Apply centrality measures appropriately	Assessment

Course Contents:

	Topics	Topics Outcomes	No of Lectures
1	Introduction	1.Understand what constitutes a social network 2. Identify and describe different levels of analysis 3. Formulate problems in terms of network variables	3
2	Mathematical Foundations	1. Represent networks in graph-theoretic language 2. Identify paths, walks, trails and components	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

		3. Formulate networks in matrix terms 4. Compute and interpret multiplication of adjacency matrices	
3	Research Design	1. Design effective and reliable network research projects 2. Identify sources and boundaries of network data 3. Understand and minimize the effects of data error	4
4	Data Collection	1. Identify sources of network data 2. Design effective network questionnaires 3. Mine archival and electronic sources for network data	3
5	Data Management	1. Configure network and attribute data for standard software packages 2. Apply elementary transformations to matrix data 3. Extract and reconfigure network and attribute data	4
6	Multivariate Techniques Used in Network Analysis	1. Represent one- and two-mode data in a two-dimensional map 2. Cluster data into groups using hierarchical clustering 3. Correctly interpret the information contained in the clusters and maps	4
7	Visualization	1. Visualize networks with or without node attributes in a meaningful	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		way 2. Embed edge characteristics in network diagrams 3. Represent network change over time graphically	
8	Testing Hypotheses	1. Comprehend the reasons for using, and principles of, permutation tests 2. Formulate testable hypotheses at the dyadic, monadic and whole-network level 3. Understand when SIENA and exponential random graph models may be appropriate	4
9	Characterizing Whole Networks	1. Calculate and interpret cohesion measures in a whole network 2. Undertake a triad census 3. Compute and evaluate measures of transitivity, reciprocity and clustering	4
10	Centrality	1. Apply centrality measures appropriately 2. Interpret the results of a centrality analysis on undirected, directed and valued data 3. Understand the limitations and constraints of the standard centrality measures	4
11	Subgroups	1. Understand the similarities and	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		differences of the main approaches in detecting cohesive subgroups 2. Select appropriate methods given the size and nature of the network 3. Perform a cohesive subgroup analysis on a variety of types of network	
			Total=42

Suggested Text Book(s):

1. Analyzing Social Networks 1st Edition by Stephen P Borgatti, Martin G. Everett, Jeffrey C. Johnson, SAGE Publications Ltd; 1 edition

Suggested Reference Book(s):

2. Influence and Behavior Analysis in Social Networks and Social MediabyMehmet Kaya, Reda Alhajj, Lecture Notes in Social Networks, Springer International Publishing
3. Emerging Research Challenges and Opportunities in Computational Social Network Analysis and Mining by Nitin Agarwal, NimaDokoohaki, Serpil Tokdemir, Lecture Notes in Social Networks, Springer International Publishing

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	35	2 hours	Syllabus covered upto Test-3
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10-	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	1	3	1	3	2.4
Average	3	3	3	2	2.7	2.8	2	2	2.3	3	1	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Name: Software Agents

Course Code: 11B1CI731

Course Coordinator: Dr. Yugal Kumar

Prerequisites

Software Engineering, Unified Modelling Language (UML)

Post-courses

Software Systems, Advanced Software Engineering

Objectives

The aim of the course is to introduce the student to various software agents tools and learning to automate a system that will take decisions independently. The student learns about software agent's fundamentals, describes the main characteristics of agents, how they react to user oriented architectures, representing the goal driven methodology, implementing agents with tools like Prometheus and GAIA, working with predicate logic to establish language for agents, providing multi-agent decision making methodology, developing multi-agent systems like JACK, plan based semantics and standards for communication among software agents. The student will be exposed to dealing with software agent's architectures and softwares through various tools with the help of predicate logics.

Learning Outcomes

The students shall deepen the generic skills to design and implement software agents, software agent's tools, architectures for a broad-based set of user-computer and automating systems in various domains.
The course will use the mixed technique of interactive lectures, guided case studies, literature survey, regular assignments and project work. In addition to the material covered in the class, students will be required to explore, study, evaluate, present several agent tools. Teaching in this course is designed to engage the students in active and experiential learning by taking a problem solving and design oriented approach with special emphasis on real world applications. Lectures will be highly interactive and work oriented. Students will have to work individually as well as in groups inside as well as outside the class. Each student is also expected to choose a topic from the list provided. There should be a report component, on the order of 10 pages, let's say in the range 5-20 pages and they will give a presentation about their project.

Syllabus and Lecture Plan	
Introduction to Software Agents: Software Agents, Trends in Agents, Multi-Agent Systems, Vision, Spacecraft Control, Autonomous Agents, Air Traffic Control, Internet Agents	3
Intelligent Agents: Agents, Reactive Agents, Proactive Agents, Social Ability, Agent and Objects, Agent and Expert Systems, Environments for Agents, Intentional Systems	4
Predicate Logic: Predicate Logic, First Order Logic, Representing Relationaship, Reasoning, Conversion to Clause Form	3
Abstract architectures for agents: Agent Architectures, Reasoning Agents, Blocks World, Green's Method, Unstack, Frame and Axioms, Practical Reasoning Agents, STRIPS Idea, BDI Architecture, Practical reasoning Agents, Prcedural Reasoning System, Rodney Brooks, Subsumption Architecture, Free-flow Architecture, Hybrid Agents, Horizontally/Vertically Layered Architecture	6
Multi Agent Decision-Making: Multi-Agent Systems, Utility, Multiagent Encounters, Raional Action, Payoff Matrices, Dominant Strategies, Nash Equilbrium, Prisoner's Dilemma, Axelrod's Tournament,	4
Agent Oriented Software methodologies like Prometheus, Gaia, Agent UML andothers, Using Prometheus Design Tool (PDT): AOSE Introduction, Agent based Approach, GAIA, Tropos, Prometheus Methodologies, Formal Methods for AOSE, Agent based Systems,	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Prometheus Design Tool (PDT), Prometheus Methodology, Agent oriented Programming, Agent UML, Class Diagram, Interaction Diagram	
Reaching Agreements, Developing Multi Agent Systems usingJACK: Reaching Protocols, Meachanisms and Strategies, Auctions, Auction parameters, Vickrey Auctions, Lies and Collusion, Task Oriented Domain, Negotiation Protocols, Zeuthen Strategy,	4
Agent Communication, Standards for Agent Development like FIPA: Agent Communication, Speech Acts, Plan based Semantics, Knowledge Interchange Format, Foundation for Intelligent Physical Agents (FIPA)	4
Agent Communication Standards (Working Together): WorkingTogether, Benevolent Agents, Self-Interested Agents, Task/Result Sharing, Contract Net, Cooperative Distributed Problem Solving, Domain Specific Evaluation, Types of Messages, Node and their Roles, Hearsay II Speech Understanding System, Blackboard Architecture, Internode Communication, Domain	6
Agent Support Technologies/Methodologies: Pitfalls of Agent Development, Generic Solutions to 1-Off Problems, Confuse Prototypes with Systems, Don't Exploit Related Technology/Concurrency, Generic Architecture, Implementing Infrastructure, Mobile Agents, Security for Host/Agents, Telescript, TCL/TK and Scripting Languages,	4
Total Hrs. **42**	

Evaluation Scheme

Evaluation scheme is designed to promote and test higher level thinking skills through holistic and continuous evaluation and de-emphasis rote learning. Written exams will be designed and conducted as close/open book(s), close/open notes tests. One of the minor tests will be designed and conducted as a take home test and will be based on individual's research and literature survey. Evaluation scheme will have following components:

T1	15	
T2	25	
T3	35	
Teachers Assessment	25	(i, ii, and iii)
(i) Mini Project	10	
(ii) Quiz and Assignment	10	
(iii) Attendance	5	
Total	100	

Reference Material

1) Jeffrey M. Bradshaw: Software Agents
2) MIT Press: Software Agents
3) Jeffrey M. Bradshaw: Software Agents (American Association for Artificial Intelligence)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Underground Technology

COURSE CODE: 10B13CE736

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Geotechnical Engineering and Foundation Engineering

Course Objectives:

1. To impart the knowledge of recognizing the diversity and complexity of underground excavation sand associated works such as foundation construction.
2. To provide guidance for support selection of underground openings which is dependent upon the ground conditions, excavation size and shape and excavation method employed.
3. To inculcate the understanding of ground improvement and develop knowledge of different ground improvement techniques.
4. To understand, analyze and design flexible retaining structures
5. To provide knowledge of tunneling and various aspects of tunnel engineering.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the conditions and structures required for underground structure.	Familiarity
CO-2	Stabilize excavation for underground construction using sheet piles, anchored bulkheads, management of ground water conditions and apply dewatering methods.	Assessment
CO-3	Design and understand the construction methodology of deep foundation, analyze side - support systems for underground excavations.	Assessment
CO-4	Solve problems related to required ground conditions, side – support system, lining and design tunnels with its various components.	Usage
CO-5	Understand the construction methodologies for side - support system required for underground excavation , coffer dams, caissons, wells, basement and tunnel construction.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction**: Introduction to various underground structures, Underground construction methodology & equipments.	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Underground construction**: Excavations, soil support methods, diaphragm walls, reinforced earth.	5
3	**Ground Water management**: Management of groundwater, dewatering methods Coffer dams, Caisson & wells.	6
4	**Permanent Support and Temporary Support system**: Methods of Basement construction, bracing system.	8
5	**Ground Improvement**: Grouting, In – situ Densification: Preloading, Compaction Grouting, Dynamic Compaction, Blast densification, Vibro–Compaction and Vibro–Replacement, Compaction piles, Reinforcement of embankments and foundations.	6
6	**Tunnels**: Introduction, Tunnel stabilization and lining, Cut and Cover Tunnels, Bored Tunnels, Immersed Tube Tunnels, Water Conveyance Tunnels, Micro-tunnels.	6
7	**Underground Conduits**: Ditch Conduits, Positive Projecting Conduits, Negative Projecting Conduits, Imperfect Ditch Conduits, Tunneled Conduits.	6
Total lectures		42

Suggested Text Book(s):

1. Geotechnical Engineering by Gulati and Dutta(TMH)
2. Tunnel Engineering Handbook edited by Bickel, Kuesel andKing

Suggested Reference Book(s):

1. Foundation Engineering Handbook, edited by Winterkorn &Fang
2. Construction technology by Roy Chudley& RogerGreen
3. Advance Construction Technology by Roy Chudley& RogerGreen
4. Railway Bridges and Tunnels by Vazirani andChandola

Other useful resource(s):

1. Link to NPTEL course content:https://nptel.ac.in/courses/105103093/24
2. Links related to topics of course:https://nptel.ac.in/courses/10510 8069/5 https://freevideolectures.com/course/3269/advanced-foundation-engineering/25https://nptel.ac.in/courses/105106055/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Underground Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	1	2	2	0	3	3	1	1	**2.0**
CO-2	2	3	3	2	2	3	2	1	2	1	1	3	**2.1**
CO-3	3	2	2	2	1	3	1	1	2	2	2	3	**2.0**
CO-4	3	3	3	2	2	3	2	2	1	1	1	2	**2.1**
CO-5	3	3	3	2	0	2	1	1	2	1	2	3	**1.9**
CO-6	2	2	2	2	1	3	3	0	3	2	2	3	**2.1**
Average	**2.67**	**2.5**	**2.67**	**2.17**	**1.17**	**2.67**	**1.83**	**0.83**	**2.17**	**1.67**	**1.5**	**2.5**	

Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Bio-resources and Industrial Product (*Core Course*14B1WBT 741)

(B.tech, Sem VIII) **Credits 3**

Lectures 3 Tutorial 0 Practical 0

Pre-requisites: Biochemistry, fundamental biology, chemistry

Course Objectives (Learning Goal):

The use of natural, renewable and/or bio-resources is becoming more and more important to for sustainable growth along with enormous challenges at economic, environmental level. The Objectives of the course are

1. To make the student understand the value of bio-resources
2. Introduction to bio-renewable products, processes and their related industrial sectors viz. Medicine, Food , agriculture , bio-chemicals, bio-composites, bio-energy & biofuel, and forest products.

Course Assessment:

Test 1	15
Test 2	25
Test 2	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

At the end of the course students will have a fundamental understanding of the natural bioresearches and able to

Co-PI: Define "bioproduct" to reflect the scope and focus of opportunities to understand environmentally sustainable science-based processes of conversion of living organism-based resources into manufactured goods

Co-PII:. Develop a workable concept of bio-resource utilization with respect to broad economic feasibility, considerations of bio-resource availability, conversion (technologies) and receptor industries (markets).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outline

S.N.	Topic		Lecture
1	Overview	• Resources (Renewable & Non-renewable) • Bio-resources • Bio-resources Engineering • Different Scale of Bio-resource Engineering	4
	Raw Material Resource	• Microbial Bio-resources • Plant Bio-resources • Animal Bio-Resources	6
2	Industrial Products	• Novel Plant Bioresources: • Medicine • Food • Cosmetics	12
3	Industrial Products	• Animal Bioresources: • Medicine • Food • Cosmetics	5
4	Industrial Products	• Microbial Bioresources: • Medicine • Food • Cosmetics	6
5	Processing Technology	• Biorefinery Concept • Processes for converting Raw material to biobased product • Novel Development in Procesing Technology	6
6	Case Study	• Case study of lignocellolose-Ethanol Processing	2

Methodology

The course will be taught through lectures. Apart from the discussions on the topics covered in the lectures, presentations, assignments in the form of questionnaires will also be given.

Internal Assessment

Assessment	Marks
Quiz/presentations	15
Assignment	5
Attendance	5
TOTAL	**25**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Books and references

Text Books:

- ✓ Renewable Bioresources: Scope and Modification for Non-food Applications Editors CHRISTIAN V. STEVENS
- ✓ Biotechnology for Agro-Industrial Residues Utilisation Poonam Singh nee' Nigam · Ashok Pandey
- ✓ Emerging Bioresources with Nutraceutical and Pharmaceutical Prospects: Seema Patel
  San Diego State University, San Diego, California, USA, Springer
- ✓ Dairy Chemistry and Biochemistry P.F. FOX and P.L.H. McSWEENEY Department of Food Chemistry University College, Cork Ireland

Reference Books and material

- ✓ Review articles on relevant topics from diverse sources
- ✓ *BioResources* (ISSN: 1930-2126): a peer-reviewed online journal devoted to the
- ✓ science and engineering of lignocellulosic materials, chemicals, and their applications for new uses and new capabilities

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

C# and VB.NET

COURSE CODE: 18B1WCI637

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: C/C++ and OOPs

Course Objectives:

1. Knowledge of .NET Framework.
2. Programming in C # and VB.NET in Visual Studio Environment
3. Knowledge of object-oriented programming in the C # and VB.NET languages
4. Programming for windows application development
5. Programming for web application development

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Comprehensive knowledge of .NET Framework, C#.NET and VB.NET	Familiarity
CO-2	Knowledge of C#.NET and VB.NET languages.	Assessment
CO-3	Students will able to develop windows applications using C# and VB.NET	Assessment
CO-4	Students will able to develop web applications using ASP.NET with C# and VB.NET	Assessment
CO-5	Develop a data driven windows and web application	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**.NET Framework**: Introduction to C#.NET, VB.NET and VS.NET, Features of C#.NET,VB.NET and VS.NET, The Common Language Runtime (CLR), Memory Management, Cross Language Integration, metadata and the IL Disassembler. C# and VB.NET basics ,Class, Objects, Inheritance, Polymorphism, Error Handling, Common Type System (CTS), .NET Framework Class Library (FCL), Microsoft Intermediate Language(MSIL), Just In Time(JIT) Compiler, Garbage Collection	7
2	**Windows Programming:** Intro to C# and VB.NET GUI dev in Visual Studio, Windows Forms and built in controls, Delegates and Events, Common Controls, Button, CheckBox, Label, Dialog boxes, TreeView and ListView, Custom Controls etc.	7
3	**ASP.NET using C# and VB.NET**: Introduction of ASP.NET using C# and VB.NET, Concept of Web Applications, ASP.NET Architecture, Page Composition Parts ASP.NET, Page Life Cycle, Page Life Cycle Events, ASP.NET Server Controls, HTML Server Controls, Web Server Controls, List Controls, Validation Controls, User Controls & their uses, Navigation Controls, Login Controls, Custom Controls	11
4	**ADO.NET:** Introduction of SQL, Components of SQL, Basic SQL Commands, Data Binding in ASP.Net, Data Binding Expressions, Data Sources & Controls, Insert, Update, Delete Operations using Data Source Controls, Working with Grid View Control Data bound controls DetailsView control **Security and Deployment:** Security in the .NET framework and Deployment in the .NET	7

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Total lectures	32

Suggested Text Book(s):

1. .NET Framework Essentials, 3rd Edition by By Hoang Lam, Thuan Thai Publisher: O'Reilly Media
2. Head First C#, 3rd Edition By Andrew Stellman, Jennifer Greene Publisher: O'Reilly Media
3. ASP.NET 4 Unleashed 1st Edition, by Stephen Walther

Suggested Reference Book(s):

1. Pankaj Agrawal – Principal of .Net Framwork
2. Vaya Kogent - .NET Programming Black Book – Wiley
3. VB.NET Black Book by Steven Holzner –Dreamtech
4. VB.NET –Wrox Publication
5. C# programming Black Book by Matt Telles

Other useful resource(s):

1. Link to topics related to course:
   - i. https://docs.microsoft.com/en-us/dotnet/
   - ii. https://msdn.microsoft.com/en-us/library/ff361664(v=vs.110).aspx
   - iii. https://msdn.microsoft.com/en-us/library/aa286485.aspx
   - iv. https://blogs.msdn.microsoft.com/dotnet/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (C# and VB.NET)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	21	3	4.2
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.8	2.8	2.2	2	2.2	3	5	3	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Structure and Software Design

COURSE CODE: 18B1WCI631

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objectives:

1. Apply array and stack data structures in mathematical problem solving and implementing various compiler and operating systems mechanisms, respectively.
2. Apply queue and linked list to implement various compiler and operating systems mechanisms.
3. Apply tree and graphs to implement various compiler, computer networks and real time google map applications.
4. Apply priority queue to implement scheduling jobs, sorting huge files and shortest path computation. Apply hashing in implementation of programming languages, file systems, pattern search, and distributed system concepts.
5. Apply data structures in Computer Networks, databases, and image & computer vision.
6. Understanding data structures used in audio/video files, 2D/3D maps, and machine learning & genetics.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn to apply array and stack data structures in mathematical problem solving and implementing various compiler and operating systems mechanisms, respectively.	Assessment
CO-2	To learn to apply queue and linked list to implement various compiler and operating systems mechanisms.	Assessment
CO-3	To learn to apply Apply tree and graphs to implement various compiler, computer networks and real time google map applications.	Assessment
CO-4	To learn to apply priority queue to implement scheduling jobs, sorting huge files and shortest path computation. Apply hashing in implementation of programming languages, file systems, pattern search, and distributed system concepts.	Assessment
CO-5	To learn to apply data structures in Computer Networks, databases, and image & computer vision.	Assessment
CO-6	To learn and understand data structures used in audio/video files, 2D/3D maps, and machine learning & genetics.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Arrays:** finding maximum, minimum, mean, median, average; performing operations – sorting, merging, traversal and retrieval; representing matrices in computer''s memory for solving many complex mathematical problems and image processing transformations **Stacks:** evaluating arithmetic expressions, storing function arguments and local data as programs are executed, storing local variables used inside a function block in compilers/operating systems, undo mechanisms in text editors, backtracking in	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Cloud Computing

COURSE CODE: 18B1WCI737

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Operating System

Course Objectives:

1. To demonstrate an understanding of cloud computing concepts and standards.
2. To understand all enabling technologies of Cloud computing.
3. To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
4. To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To understand different enabling technologies for Cloud computing environment.	Assessment
CO-3	To design Cloud computing data-center for effective utilization of available resources	Usage
CO-4	To study different managers related to Cloud computing services	Assessment
CO-5	To understand dofferent case studies of Cloud computing and its advance topics	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Understanding Cloud Computing:** Basic Concepts and terminology, Goals and Benefits. Risks and Challenges, Roles and boundaries, Cloud characteristics, Cluster Computing, Grid Computing, NIST Architecture, Cloud Deployment models, Cloud service models.	7
2	**Cloud Enabling Technologies:** Virtualization, Types of virtualization, Server Consolidation, virtualization management, Web Technology, Service, Oriented Architecture, Datacenter and Multi-tenancy	7
3	**Cloud Infrastructure Management:** Cloud datacenter design, Workloads and software infrastructure for a datacenter, Datacenter hardware, energy and power efficiency in a datacenter., Cloud usage monitor, Monitoring agent, Resource agent, Polling Agent	7
4	**Cloud Mechanisms:** Automated Scaling, Load Balancer, SLA Monitor, Failover System, Multi-Cloud Broker	7

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Fundamental Cloud Architectures:** workload distribution architecture, resource pooling architecture, dynamic scalability architecture, service load balancing architecture, cloud brusting architecture. Billing Management System Business cost metrics, cloud usage cost metrics,	7
6	Cloud service metrics., Cloud Security, Mobile cloud computing, Disaster recovery in cloud computing, Case studies	7
Total lectures		**42**

Suggested Text Book(s):

1. Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568
2. Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.

Suggested Reference Book(s):

1. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
2. The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
3. Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
4. The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
2. Link to topics related to course:
   i. https://www.edx.org/learn/cloud-computing
   ii. https://www.udemy.com/introduction-to-cloud-computing/

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Cloud Computing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	2	2	1	2	2	1	2	3	**1.8**
CO-2	3	2	1	2	2	2	1	2	2	1	3	2	**1.9**
CO-3	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-4	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-5	3	3	3	3	3	1	2	1	2	2	3	2	**2.3**
Average	**2.6**	**2**	**2.2**	**2**	**2.2**	**1.4**	**2**	**1.8**	**1.6**	**1.2**	**2**	**1.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Cognitive Radio Networks

(Elective Subject)

Course Code:	14B1WEC733	Semester:	7th Sem. B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course objectives

1. To understand the spectrum scarcity problem and how cognitive radio deals with this problem.
2. The contribution of cognitive radio systems in wireless networks and its architectures that enable the development of the cognitive radio network (both centralized and distributed).
3. Technologies to allow an efficient use of TVWS for radio communications.
4. Discussion about various cognitive radio standards.
5. Understanding the various research challenges for deployment of cognitive radio network.
6. Update about current research scenario in this field

Course outcomes

Upon successful completion of this course the students will have developed following skills/abilities

1. Fundamental issues regarding dynamic spectrum access and radio-resource management.
2. Emerging issues in cognitive radio network.
3. Different spectrum sharing models.
4. Efficient sharing of the unutilized spectrum among cognitive and licensed users.
5. Interference avoidance at licensed user due to cognitive user's transmission.

Unit	Topics	Lectures
1.	**Introduction to Cognitive Radio:** Spectrum scarcity, Spectrum white space, Fixed spectrum allocation, Software defined radio (SDR), Limitations of SDR, Evolution of cognitive radio, Dynamic spectrum access, Introduction to cognitive radio concept, Cognitive cycle, Functions of cognitive radio; spectrum sensing, spectrum management, spectrum mobility, Cognitive radio architecture, Interference temperature and its models.	8
2.	**Spectrum Sensing and challenges in cognitive radio network:** Hypothesis model for spectrum sensing, Types of spectrum sensing; Non-cooperative sensing, Cooperative sensing, Interference-based sensing, Matched filter detection, Energy detection, Cyclostationary feature detection, advantages and disadvantages of various spectrum	11

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	sensing techniques, False alarm, Miss detection, Optimal sensing framework for infrastructure based cognitive radio network. Research challenges in spectrum sensing, spectrum management and spectrum mobility, potential applications of cognitive radio, IEEE 802.22 for WRANs.	
3.	**Spectrum sharing and management:** Dynamic spectrum Access (DSA): models and architectures, Opportunistic spectrum access (OSA), Antenna Systems, MIMO systems, Smart antenna and beamforming. SDR architecture, Software tunable analog radio components, Reconfigurable digital radio technologies.	8
4.	**Cross layer adaptation and security in cognitive radio:** Why we need cross-layer design, adaptation and optimization, Cognitive radio cross layer design, security challenges in cognitive radio. **OFDM for cognitive radio:** OFDM based cognitive radio, Why OFDM is a good fit for Cognitive radio, Challenges to cognitive OFDM systems, Multiband OFDM, A step toward cognitive-OFDM: standards and technologies.	9
5.	**Cognitive radio regulation and standardization:** regulatory issues and new spectrum management regimes, spectrum planning, Spectrum authorization, Standards and international activities. **UWB cognitive radio:** Introduction, Fundamentals of impulse radio Ultra Wideband, Cognitive radio requirements versus IR-UWB, Merging impulse radio with cognitive radio.	6
	Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Recommended Reading

1.	Dynamic Spectrum Access and Spectrum Management in Cognitive Radio Networks, Ekram Hossain, Dusit Niyato, and Zhu Han, Cambridge University Press, 2009.
2.	Cognitive Radio Networks, Yang Xiao and Fei Hu, CRC Press.
3.	Cognitive Radio Technology, Bruce Fette, Elsevier, 2006.
4.	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Huseyin Arslan, Springer, 2007.
5.	Essentials of Cognitive Radio, Linda E. Doyle, Cambridge University Press, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Molecular Evolution

15B1WBI834 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology, evolutionary biology, functional genomics and various kind of graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop functional and evolutionary genomic understanding of biological entities for various kind of lineages for biological data types such as DNA, RNA, Genes, Proteins etc.

Course Assessment:

T-1 test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis

CO II: Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information

CO III: Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data

Topics covered:

Introduction to molecular evolution and its role in the regulation of various biological processes.

Introduction to evolutionary biology, functional genomics, basics of data types for biological

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

sequences their importance and applications in further analysis. Genes, operons, regulons, stimulons, genomes, proteins, proteomes etc. Patterns of base composition and codon usage, gene duplication, pseudogenes, orphan genes, gene gain and gene loss processes, overlapping and nested genes, exonization, intron and RNA editing, functional convergence, hypothetical proteins and their annotations. Various kind of mutations and selection pressure and related theories. Description of models, methods and algorithms that are most useful for analysing the ever-increasing supply of molecular sequence data, with a view to furthering our understanding of the evolution of genes, proteins, and genomes. Models of nucleotide substitution, models of amino acid and codon substitution, phylogeny reconstruction: Overview, Maximum Likelihood methods, Bayesian methods, comparison of methods and tests on trees, molecular clock and estimation of species divergence times, neutral and adaptive protein evolution, simulating molecular evolution.

Text and Reference books

1. Molecular Evolution
   by Dan Graur and Wen-Hsiung Li, Sinauer Associated Inc. Pub., USA
2. Computational Molecular Evolution
   by Ziheng Yang, Oxford Series in Ecology and Evolution
3. Molecular Evolution: A phylogenetic approach
   Rodric DM Page and Edward C Holmes, Blackwell Science Ltd.
4. Inferring Phylogenies
   J. Felsenstein, . Sinauer Associated Inc. Pub., USA
5. Molecular Evolution and Phylogenetics
   Masatoshi Nei and Sudhir Kumar, Oxford University Press
6. Bioinformatics and Molecular Evolution
   by Paul G Higgs, Blackwell Publishing

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis	H	H	H	L	H	H	M	86
CO-II	Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information	H	H	H	M	H	H	M	90
CO-III	Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data	H	H	H	M	H	H	H	95
	Assessment (%)	100	100	100	56	100	100	78	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computer Vision

Course Code: 18B1WCI840
Course Credits: 3-0-0
Instructor: Mr. Surjeet Singh
OE for B Tech 8th Sem CSE/IT

Course Outcomes(COs):

Sr No	Course Outcomes (Computer Vision)	Level of Attainment
CO-1	To understand the concepts of digital image processing	Familiarity
CO-2	To understand the concepts of depth estimation and Multi-camera views	Assessment
CO-3	To understand the concepts of Feature Extraction	Assessment
CO-4	To understand the concepts of Image Segmentation	Assessment
CO-5	To understand the concepts of Pattern Analysis	Usage
CO-6	To understand the concepts of Motion Analysis	Assessment
CO-7	To understand the concepts of Shape formation	Usage

Course Outline:

Modules	Contents	Lectures required
Module 1	UNIT - I- Digital Image Formation and low-level processing Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing	5
Module 2	UNIT-II- Depth estimation and Multi-camera views Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration	7
Module 3	UNIT-III- Feature Extraction Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.	6
Module 4	UNIT-IV- Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection	7
Module 5	UNIT-V- Pattern Analysis Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised;	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods	
Module 6	UNIT-VI- Motion Analysis Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation	8
Module 7	UNIT-VII- Shape from X Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges	4

CO-PO Articulation (Computer Vision)													
Sr No	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	Weightage
CO-1	3	3	3	2	3	3	2	2	2	2	2	3	60%
CO-2	3	3	3	2	2	2	2	2	2	2	2	3	77%
CO-3	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-4	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-5	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	3	3	3	3	3	3	3	3	3	70%
Weightage	100 %	100 %	100 %	70 %	80 %	90 %	60 %	80 %	100 %	70 %	80 %	100 %	

CO- PSOs Articulation					
Sr No	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	
CO-1	3	2	2	2	**79**
CO-2	2	3	2	3	**79**
CO-3	3	2	3	2	**81**
CO-4	2	2	2	2	**75**
CO-5	2	3	2	3	**79**
CO-6	3	2	3	2	**79**
Average Score	**81**	**82**	**85**	**76**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CONTEMPORARY INDIA IN GLOBALIZED ERA: CHALLENGES OF DEMOCRACY AND DEVELOPMENT

COURSE CODE: 18B1WHS831

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.
2. The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.
3. The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.
4. The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.	Familiarity
CO-2	The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.	Familiarity
CO-3	The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.	Familiarity
CO-4	The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Contextualising Modern India:** Overarching visions of India's national movement: domestic and international, Challenges of nation-building within its domestic contours, Continuities and shifts in Indian polity and society, Rising aspirations and constraints in post Globalized era, Digitising India: Prospects and Challenges	10
2	**India in World Affairs:**Gandhi-Nehru Legacy and policy of nonalignment: Formative Years, Post-Cold war challenges and changing global configurations, India's growing role in world affairs: soft power capacity, diaspora, major bilateral,	15

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	regional and global concerns and aspirations, India and Major Powers, India and its neighbours, India and Brics	
3	**India's security concerns:** External Threats: China and Pakistan,Internal Threats: Kashmir and Northeast, Spectre of Terrorism	9
4	**Non-traditional Security:** Human Security Concerns, Energy Security, Water and Food Security, Health and Safety	6
5	**Challenges ahead:** India has had a phenomenal rise in terms of economic growth, technical knowhow, and has performed well on various other parameters. Nonetheless there are severe constraints to its unfolding. This topic will cover some of the challenges that India is facing today and the measures it is taking to overcome them.	2
Total lectures		42

Suggested Text Book(s):

1. Tharoor, Shashi. 'India: From Midnight to the Millennium'
2. Wajid Ali, H.M. 'India and the Non-aligned Movement'
3. Budhania, Rajpal. 'India's National Security Dilemma'
4. Asthana, Vandana. Shukla, A.C. 'Water Security in India'

Suggested Reference Book(s):

1. Candra Bipin, 'Freedom Struggle'
2. Ram Chandra Guha, 'India after Gandhi'
3. Tharoor, Shashi. 'India: From Midnight to the Millennium'
4. Chandra, Bipan. 'India since Independence'
5. Sen, Amartya. 'Development as Freedom'
6. Ninan Thomas,Pradeep. 'Digital India: Understanding Information, Communication and Social Change'
7. Menon, Shivshankar. 'Choices: Inside the Making of Indian Foreign Policy'
8. Wajid Ali, H.M. 'India and the Non-aligned Movement'
9. Mandrup, Thomas. 'The BRICS and Coexistance'
10. Sikri, Rajiv. 'Challenge and Strategies: Rethinking India's Foreign Policy'
11. P. Bajpai, Kanti. Pant, Harsh.V. 'India's National Security'.
12. Budhania, Rajpal. 'India's National Security Dilemma'
13. Sondhi. M.L. 'Nuclear Weapons and India's National Security'
14. Centre for Strategic Studies - 'Energy Security Challenges: Non Traditional Security Planning in India'
15. Asthana, Vandana. Shukla, A.C. 'Water Security in India'
16. Kolas, Ashild and Miklian, Jason. 'India's Human Security: Lost Debates, Forgotten
17. People, Intractable Challenges'.
18. Venkateshwar, Sita. 'Globalisation and the Challenges of Development in Contemporary India'

Other useful resource(s):

1. https://www.goodreads.com/book/show/356824.India_After_Gandhi
2. https://www.springer.com/in/book/9789811004537
3. https://www.academia.edu/35220477/NonAligned_Movement_A_Historic_Movement_reinventing_itself_for_Future_NonAligned_Movement_A_Historic_Movement_reinvening_itself_for_Future
4. https://www.routledge.com/Indias-Human-Security-Lost-Debates-Forgotten-People-Intractable-Challenges/Miklian Kolas/p/book/9780415830683

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Report writing (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Contemporary India in Globalized era: Challenges of Democracy and development)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	2	2	3	3	3	3	3	0	3	2.7
CO-2	0	3	0	2	2	3	3	3	2	3	0	3	2.6
CO-3	0	2	0	2	3	3	3	3	2	3	0	3	2.6
CO-4	0	0	0	2	2	3	3	3	2	3	0	3	2.6
Average	0	2.5	3	2	2.2	3	3	3	2.2	3	0	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Control Systems

COURSE CODE: 18B1WEC531

COURSE CREDITS: 3

CORE/ELECTIVE: PROFESSIONAL ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand procedures for developing mathematical models of physical systems, and related analytical and numerical methods for predicting their behavior.
2. To understand stability of state space models and their controllability and observability in modern automation and control.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The ability to analyze any physical system using mathematical model.	Familiarity
CO-2	The ability to formulate reduced models for complex systems.	Familiarity
CO-3	The skill to analyze the response of any LTI system.	Assessment
CO-4	The ability to design any system with desired specifications both in time and frequency domain.	Assessment
CO-5	The ability to derive, interpret and solve problems using modern state space control methods for continuous time and discrete time systems.	Usage
CO-6	The skill to apply advance control schemes for various applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Systems and Control: Open loop and closed loop control systems, components of control system: sensors, actuators, controllers, process, modeling principles of physical systems: electrical, mechanical, thermal and pneumatic systems, effect of feedback on gain, stability, sensitivity and noise, characteristics of transfer function models: poles, zeros, stability and minimal realization, block diagram algebra, signal flow graphs, Mason's gain formula, conversion between block diagram and signal flow graph.	6
2	Response Analysis: Standard test input signals, transient and steady state response: first, second and higher order systems, system design specifications,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	error analysis: static and dynamic error coefficients, Effect of adding poles and zeroes, Correlation-ship between time and frequency domain specifications	
3	Stability Analysis: Absolute stability, relative stability, routh-hurwitz, root locus, bode plot, polar plot and Nyquist plot techniques, gain margin and phase margin, constant magnitude loci: M-circles, constant phase Loci: N-circles, nichol's chart. system identification: inverse bode plots. Effect of adding zero to the forward path, effect of adding pole to the forward path.	8
4	Compensator Design: System design specifications, design of compensating networks (Lead, Lag, Lag-Lead) for specified control system performance using root locus and bode plot, concepts and applications of P, PD, PI and PID controllers..	6
5	Linear State Variable Models: Concept of state, state space modeling: SISO and MIMO systems, useful transformations in state space analysis and design, various forms: physical variable form, phase variable form, Jordan canonical form, solution of state equations, computation of state transition matrix: Laplace method, power series method and Cayley Hamilton method, derivation of transfer function from State variable model, decomposition of transfer function: direct decomposition, cascade decomposition, parallel decomposition, characteristics of linear state variable models, natural and forced responses, determination of controllability and observability of a control system using Kalman and Gilbert tests..	8
6	Advanced Control Schemes: Control systems with multiple loops- cascade control, selective control systems: override control, split range control, feed-forward and ratio control, adaptive and inferential control systems.	6
Total lectures		42

Suggested Text Book(s):

1. Benjamin C. Kuo: Automatic Control Systems, 9th Ed., Prentice Hall of India, 2014.
2. Nagrath& Gopal: Control System Engineering, 6th Ed., New Age International Pvt Ltd, 2018.
3. Stephanopoulos, G.: Chemical Process Control, 1st Ed., Prentice Hall of India, 2008.

Suggested Reference Book(s):

1. K. Ogata: Modern Control Engineering, 5th Ed., Prentice Hall India Learning Private Limited, 2010.
2. Norman S. Nise: Control Systems Engineering, 6th Ed., John Wiley & Sons Inc, 2010.
3. Richard C Dorf, Robert H Bishop: Modern Control Systems, 12th Ed., Pearson Edu Pearson, 2014.

Other useful resource(s):

4. Link to NPTEL course contents: Control systems
https://onlinecourses.nptel.ac.in/noc18_ee41/preview

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (3) - 10 Quizzes(3) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Structure and Software Design

COURSE CODE: 18B1WCI631

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objectives:

1. Apply array and stack data structures in mathematical problem solving and implementing various compiler and operating systems mechanisms, respectively.
2. Apply queue and linked list to implement various compiler and operating systems mechanisms.
3. Apply tree and graphs to implement various compiler, computer networks and real time google map applications.
4. Apply priority queue to implement scheduling jobs, sorting huge files and shortest path computation. Apply hashing in implementation of programming languages, file systems, pattern search, and distributed system concepts.
5. Apply data structures in Computer Networks, databases, and image & computer vision.
6. Understanding data structures used in audio/video files, 2D/3D maps, and machine learning & genetics.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn to apply array and stack data structures in mathematical problem solving and implementing various compiler and operating systems mechanisms, respectively.	Assessment
CO-2	To learn to apply queue and linked list to implement various compiler and operating systems mechanisms.	Assessment
CO-3	To learn to apply Apply tree and graphs to implement various compiler, computer networks and real time google map applications.	Assessment
CO-4	To learn to apply priority queue to implement scheduling jobs, sorting huge files and shortest path computation. Apply hashing in implementation of programming languages, file systems, pattern search, and distributed system concepts.	Assessment
CO-5	To learn to apply data structures in Computer Networks, databases, and image & computer vision.	Assessment
CO-6	To learn and understand data structures used in audio/video files, 2D/3D maps, and machine learning & genetics.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Arrays:** finding maximum, minimum, mean, median, average; performing operations – sorting, merging, traversal and retrieval; representing matrices in computer"s memory for solving many complex mathematical problems and image processing transformations **Stacks:** evaluating arithmetic expressions, storing function arguments and local data as programs are executed, storing local variables used inside a function block in compilers/operating systems, undo mechanisms in text editors, backtracking in a series of elements, parsing computer languages in compilers, processing	7

	function calls and implementing recursive functions, creating space for parameters and local variables in language processing, compiler"s syntax check for matching braces	
2	**Queues:** interrupts in operating system, how application programs store incoming data, process synchronization in operating system, CPU job scheduling and disk scheduling, **Linked lists:** dynamic memory management, representing polynomials and performing addition, subtraction, multiplication, etc. with polynomials, symbol tables for balancing parenthesis and representing sparse matrix	5
3	**Trees:** syntax validation in compilers, implementing sorted dictionary, usage in Internet protocols, storing router tables, quick traversal and searching of directory structures **Graphs:** representing link structure of a website using directed graph, job scheduling problems of CPU, simultaneous execution of jobs problem between set of processors and set of jobs, real time applications of data structures: determination of cities using google maps to find population, finding addresses on maps	5
4	**Priority queues:** efficiently schedule jobs (either in the context of a computer operating system or in real life), sorting huge files (which are the most important building block for any Big Data processing algorithm), and efficiently computing shortest paths in graphs. Minimum spanning trees greedy algorithms: Kruskal"s and Prim"s **Hashing:** implementating file systems, pattern search, distributed key-value storage, hash functions used in modern distributed systems optimizing storage of services like Dropbox, Google Drive and Yandex Disk!	5
5	**Data structure for Computer Networks-** Routing tables, DNS Query, IP Config, Netstat, Address IP, Hashing for MAC tables, protocols **Data structure for popular databases:** Representing indexes with B- trees, buffer trees, quad trees, R-trees, interval trees, hashing etc. **Image & Computer Vision-** Data structure for image representation, pattern recognition, for object recognition – face, house activity analysis, Disjoint sets data structure in dynamic graph connectivity and image processing	5
6	**Data structure for video and audio systems:** Video – MPEG-4 Video File (.mp4), MPEG Video File (.mpg), Adobe Flash Video (.flv), Windows Media Video File (.wmv), Uncompressed Audio Formats – Waveform Audio File Format (WAV), Audio Interchange File Format (AIFF), Lossy Compressed Audio Formats – MPEG-1 Audio Layer-3 (MP3), Windows Media Audio (WMA), Lossless Compressed Audio	5
	Formats – Free Lossless Audio Codec (FLAC), Apple Lossless Audio Codec (ALAC), Windows Media Audio (WMA). **Data structure for 2D/3D maps:** Vector and Raster data structures, Entity-by-entity data structure (point, line, area), Topological data structures, Tessellations and the tin, Quad Trees, Maps as matrices, Map and attributes **Learned Data structures for machine learning algorithms:** Learned indexes (Cumulative Distribution Functions (CDFs)), Learned Hash- Maps, Learned Bloom filters, Comparison of traditional and learned data structures. Introduction to data structure for genetics	
Total lectures		**32**

Suggested Text Book(s):

1. Horowitz and Sahani: Fundamental of Data Structures in C, 2nd Edn, 2008

Suggested Reference Book(s):

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Data structures and network algorithms by Robert Endre Tarjan, Society for Industrial and Applied Mathematics (SIAM), ISBN-0-89871-187-8.
2. Computer Networks, 5th edition, Andrew S. Tanenbaum and David J. Wetherall, Pearson Education.
3. Data structure and operating system (Wiley series in computing) by Teodor Rus, John Wiley & Sons Ltd., ISBN-13: 978-0471995173
4. Compiling Techniques by F.R.A. Hopgood, Macdonalds http://www.chilton-computing.org.uk/acl/literature/books/compilingtechniques/contents.htm
5. Compiler construction by William M. Waite and Gerhard Goos, Springer Verlag, ISBN-0-387-90821-8.
6. Data Structures for Databases by Jaochim Hammer and Markus Schneider, https://www.cise.ufl.edu/~mschneid/Research/papers/HS05BoCh.pdf
7. Genetic Algorithms + Data Structures = Evolution Programs by Zbigniew Michalewicz, Springer, ISBN-3-540-60676-9 and ISBN-3-540-58090-5 (2nd edition).
8. Algorithms for graphics and image processing by Theo Pavlidis, Computer Science Press , Inc. Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
9. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill
10. Deo, N., Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall, 1974.
11. Digital Image Processing, R.C. Gonzalez and R.E. Woods, 2nd edition, Pearson Prentice Hall, 2008
12. Operating System Concepts by Silberschatz and Galvin, 9th Edition, John Wiley & Sons.

Other useful resource(s):

1. Data structure for 2D/3D maps: http://www.geog.ucsb.edu/~kclarke/AACC/Chapter08.pdf
2. Audio Formats : https://www.makeuseof.com/tag/audio-file-format-right-needs/Video Formats :
3. https://www.lcps.org/cms/lib/VA01000195/Centricity/Domain/1349/Resources/Video_file_formats.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Structure and Software Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	3	3	2	3	2	3	3	2.8
CO-2	3	3	3	3	2	3	3	2	3	2	3	3	2.8
CO-3	3	3	3	3	2	3	3	2	3	2	3	3	2.8
CO-4	3	3	3	3	2	3	3	2	3	2	3	3	2.8
CO-5	3	3	3	3	2	3	3	2	3	2	3	3	2.8
CO-6	3	2	2	3	3	3	3	2	3	2	3	3	2.7
Average	3	2.8	2.8	3	2.2	3	3	2	3	2	3	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Introduction to Deep Learning

COURSE CODE: XXX **COURSE CREDITS:** 3 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 3-0-0

Pre-requisite:

1) Basic knowledge of Python.
2) Basic linear algebra and probability.

Course Objectives:

1. The goal of this course is to give learners a basic understanding of modern neural networks and their applications in computer vision and natural language understanding.
2. The course starts with a recap of linear models and discussion of stochastic optimization methods that are crucial for training deep neural networks.
3. Learners will study all popular building blocks of neural networks including fully connected layers, convolutional and recurrent layers.
4. Learners will use these building blocks to define complex modern architectures in TensorFlow and Keras frameworks.
5. In the course, project learner will implement a deep neural network for the task of image captioning which solves the problem of giving a text description for an input image.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Linear regression: mean squared error, analytical solution.	Familiarity
CO-2	Logistic regression: model, cross-entropy loss, class probability estimation	Assessment
CO-3	Gradient descent for linear models. Derivatives of MSE and cross-entropy loss functions.	Assessment
CO-4	The problem of overfitting.	Usage
CO-5	Regularization for linear models.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction to optimization:** Linear regression, Linear classification Gradient descent, Overfitting problem and model validation, Model regularization, Stochastic gradient descent, Gradient descent extensions9m	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Introduction to neural networks:** Multilayer perceptron (MLP), Chain rule, Backpropagation, Efficient MLP implementation, Other matrix derivatives, what is TensorFlow, our first model in TensorFlow, What Deep Learning is and is not, Deep learning as a language	8
3	**Deep Learning for images:** Motivation for convolutional layers11m Our first CNN architecture, Training tips and tricks for deep CNNs, Overview of modern CNN architectures, Learning new tasks with pre-trained CNNs, A glimpse of other Computer Vision tasks8m	6
4	**Unsupervised representation learning:** Unsupervised learning: what it is and why bother, Autoencoders 10, Autoencoder applications, Autoencoder applications: image generation, data visualization & more, Natural language processing primer, Word embeddings, Generative models 10, Generative Adversarial Networks, Applications of adversarial approach	6
5	**Deep learning for sequences:** Motivation for recurrent layers, Simple RNN and Backpropagation, The training of RNNs is not that easy, Dealing with vanishing and exploding gradients, Modern RNNs: LSTM and GRU, Practical use cases for RNNs	8
6	**Final Project:** This week you will apply all your knowledge about neural networks for images and texts for the final project. You will solve the task of generating descriptions for real-world images!	6
	Total Lecture Hours	42

Suggested Text Book(s):

Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", The MIT Press, Cambridge, 2016.

- Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer, 2018.

Suggested Reference Book(s):

- Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media
- Andrew Ng, "Machine Learning Yearning", available online published by deeplearning.ai

Other useful resources (s):

- http://www.charuaggarwal.net/neural.htm
- https://www.coursera.org/specializations/deep-learning

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S No	Exam	Marks	Duration	verage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Introduction to Deep Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.6	2.6	2.6	2.4	1	1	1	2	2.4	1.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Embedded Systems

COURSE CODE: 19B1WEC632

COURSE CREDITS: 3

CORE/ELECTIVE: PROFESSIONAL ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

To learn about the embedded system application areas, design challenges, design and development methodology, tools used for embedded system design, embedded system integration and testing.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand various components of embedded system, design challenges and design metrics	Familiarity
CO-2	Learn about embedded system programming through 8051 microcontroller, programming and I/O interfacing	Usage
CO-3	Comprehend RISC architecture, programming of ARM and PIC microcontrollers	Usage
CO-4	Know about embedded system design and development methodology, tools and languages used for embedded system design	Usage
CO-5	Learn about integration and testing of embedded systems	Assessment

Course Contents:

Unit	Contents	Lectures required
1.	Introduction: Embedded systems overview, Classification, Application areas, Design challenges – real-time execution, physical size, power consumption, multirate operation. Design metrics – time-to-market, unit cost, performance.	4
2.	Typical Embedded System: Core of the embedded system, Sensors and actuators, Communication interface, Embedded firmware	6
3.	8051 Microcontroller: 8051 Architecture, timers and interrupts, Special function registers, Program/ data memory, addressing modes, instruction set, interrupts,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	ARM Processor Fundamentals and Architectures, ARM Instruction Set, PIC Microcontroller and its Architecture.	10
5.	Design and Development of Embedded product: Analog Electronic Components, Digital Electronic Components, Electronic design automation tools, Embedded firmware design approaches, Embedded firmware development languages	8
6.	Integration and testing of embedded hardware and firmware, Embedded system development environment, Product enclosure design and development, Embedded product development life cycle, Trends in embedded industry	6
Total lectures		42

Suggested Text Book(s):

1. Frank Vahid and Tony Givargis, "Embedded system design: A unified Hardware/Software introduction,"3rd Ed., Wiley 2014
2. Shibu K. V, "Introduction to Embedded Systems," 2nd Ed., McGraw Hill 2017

Suggested Reference Book(s):

1. Steve Furber, "ARM System-on-Chip Architecture," 2nd Ed., Pearson, 2012
2. Tim Wilmshurst, "Designing Embedded Systems with PIC Microcontrollers: Principles and Applications," 2nd Ed., Newnes, 2009
3. Steven F Barrett and Daniel J Pack, "Embedded Systems Design and Applications with the 68HC12 and HCS12," 1st Ed., Pearson 2012
4. Kenneth Ayala, "The 8051 microcontroller," 3rd Ed., Thomson, 2005

Other seful resource(s):

NPTEL ONLINE COURSES

1. Embedded Systems: https://nptel.ac.in/courses/108105057/ (Prof. A. Routray, Prof. Rajib Mall, Prof. Amit Patra, IIT Kharagpur)
2. Embedded Systems: https://nptel.ac.in/courses/108102045/ (Prof. Santanu Chaudhary, IIT Delhi)
3. Embedded Systems Design: https://nptel.ac.in/courses/106105159/ (Prof. AnupamBasu ,IIT Kharagpur)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Fault-Tolerant System Design

Course Code: 19B1WCI834
Course Credits: 3-0-0
OE for B Tech 8th Sem CSE/IT/ECE/BI

Course Outcomes(COs):

Sr No	Course Outcomes (Fault-Tolerant System Design) 19B1WCI834	Level of Attainment
CO-1	Understand modeling and designing for fault-tolerant systems	Familiarity
CO-2	Learning hardware redundancy techniques for fault tolerance	Assessment
CO-3	Learning fault tolerance from the context of hardware, software and Network	Assessment
CO-4	Learning Simulation, Fault-injection based and Practical Systems for fault tolerance	Assessment
CO-5	Applying knowledge gained on various application as case analysis	Usage

Course Outline:

Modules	Contents	Lectures required
Module-1	Introduction: Motivation, System view of high availability design, Terminology, Stochastic analysis of reliability: Discrete distributions, Continuous distributions.	8
Module-2	Hardware redundancy: Basic approaches, Static & Dynamic, Voting, Coding for detection and recovery , Application: SEC-DED codes, Error detection and correction techniques: Watchdog processors, Heartbeats, Consistency and capability checking, Data audits, Assertions, Control-flow checking, Application: Erasure-coded storage.	6
Module-3	Network fault tolerance: Reliable communication protocols, Agreement protocols, Byzantine fault tolerance, Application: Bitcoin, Modeling: Application: UltraSAN, Sharpe, Checkpointing & Recovery	14
Module-4	Experimental Evaluation: Simulation and Fault-injection based, Practical Systems for Fault Tolerance: Putting it all together, Application: Amazon Web Service, Application: Hadoop	8
	Total	**43**

CO-PO Articulation (19B1WCI834 Fault-Tolerant System Design)	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Srl	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage (%age)
CO-1	M	M	M	M	M	L	L	L	M	M	M	M	52.78
CO-2	M	H	H	H	H	L	L	L	M	M	L	M	63.89
CO-3	M	M	M	M	H	L	L	L	M	M	L	M	66.67
CO-4	M	H	H	H	M	L	L	L	M	H	M	M	66.67
CO-5	M	M	M	M	H	L	L	L	M	M	L	M	66.67
%	66.67	93.33	93.33	93.33	86.67	33.33	33.33	33.33	60.00	66.67	40.00	60.00	52.78

CO- PSOs Articulation					
Sr. No	PSO-1	PSO-2	PSO-3	PSO-4	
CO-1	3	2	2	2	79
CO-2	2	3	2	3	79
CO-3	3	2	3	2	81
CO-4	2	2	2	2	75
CO-5	2	3	2	3	79
Average Score	81	82	85	76	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Next Generation Communication Systems

COURSE CODE: 18B1WEC745

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of wireless communication and probability theory

Course Objectives:

1. To analyze the channel parameters effects on communication system.
2. Understanding of advanced techniques employed for improvement of communication system.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basics of communication system and various standards used in different generation.	Familiarity
CO-2	Understand the modeling of channel used in communication.	Familiarity
CO-3	Analyze the effect of various parameters on the performance of communication system.	Assessment
CO-4	Demonstrate the various techniques for performance improvement of communication system	Assessment
CO-5	Apply advanced techniques to next generation communication system	Usage

Course Contents:

Unit	Contents	Lectures required
1	CDMA: Introduction to various generation of cellular communication systems and standards, Introduction to CDMA and Spread Spectrum, Generation and Properties of PN Sequences, correlation between PN Sequences, Walsh Code, Variable tree OVSF, LFSR, Rake Receiver, Near-Far effect, Multi user CDMA uplink and downlink.	9
2	Channel Characterization of Next generation communication system: BER and SNR analysis of wired and wireless channels, Effect of various channel parameters on performance of wireless communication system, Doppler shift.	6
3	Diversity & Equalization: Diversity System Model, Receiver Diversity: selection diversity, feedback diversity, maximal ratio combining, equal gain combining, Equalizers, Types of Equalizers: linear equalizers, non-linear equalizers.	9
4	Principles of OFDM and MIMO wireless communication: Introduction to OFDM, OFDM Block Diagram, MIMO Wireless Communication, Benefits of MIMO Technology, MIMO OFDM Building Block, Capacity Comparisons of SISO, SIMO, MISO, and MIMO.	9
5	Singular Value Decomposition, Software Defined Radio , Cognitive Radio	9
Total lectures		42

Suggested Text Book(s):

1. T.S. Rappaport, "Wireless Communication", 2nd Edition, Prentice Hall.,2002.
2. A.Goldsmith, " Wireless communication" 1st Edition , Cambridge University Press,2005.
3. Ye Li and Gordon L. Stuber, "Orthogonal Frequency Division Multiplexing for Wireless Communications" 1st Edition, Springer, 2006.

Suggested Reference Book(s):

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Huseyin Arslan: Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, 1st Edition, Springer, 2007.

2. Hui Liu, "OFDM based broadband wireless networks: design and optimization" , 1st Edition, John Wiley & Sons, 2006.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/117104099/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Next Generation Communication Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	1	2	2	2	1	2	2	2	1.92
CO-2	3	3	3	3	2	2	1	1	1	2	2	2	2.08
CO-3	3	3	3	3	2	1	1	1	1	2	1	1	1.83
CO-4	2	3	3	2	2	1	1	1	1	2	1	3	1.83
CO-5	3	2	2	2	3	2	2	1	1	2	2	2	2.00
Average	2.6	2.8	2.6	2.4	2	1.6	1.4	1.2	1	2	1.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

Genetic Counselling

COURSE CODE: 18B1WBT831

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Genetics

Course Objectives:

1. To provide an understanding of the basis of genetic counseling, diagnostic testing and management for a variety of types of disorders and also the ethical and legal considerations.
2. The students will understand the nature of the non-directive counseling process and the need to educate the patient and family to make informed decisions relating to complex genetic situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand basics of genetic counselling, the nature of the directive and non-directive genetic counselling process and to counsel the patients with genetic diseases and help them in decision making.	Familiarity
CO-2	To understandgenetic basis of various diseases (Chromosomal, monogenic and oligogenic disorder).	Assessment
CO-3	To understand gene therapy, its role in genetic disorders and recent developments in gene therapy.	Assessment
CO-4	To understand risk assessment in genetic counseling and ethical issues in genetic counselling.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Genetic Counselling an overview:**Counseling, diagnostic testing and management of genetic disorders.	2
2	**Human chromosomal disorders:** mutations, types of mutations, chromosomal aberrations, quad screen test, Amniocentesis, karyotyping, Down's syndrome, Patau's syndrome, Edward's syndrome, Turner's syndrome, X- chromosome related syndromes.	6
3	**Human allelic diseases (monogenic and oligogenic):** Cystic fybrosis. Glucose-6-phospho dehydrogenase deficiency Bradet- Biedl syndrome and some important autosomal recessive and dominant disorders	6
4	**Muscle disorders:** Duchenne muscular dystrophy, Becker's muscular dystrophy, limb-girdle muscular dystrophies and cardiac muscle disorders.	4
5	**Neurological disorder:** Alzheimer, Hutington, Parkinson, Lewy body dementia and Schizophrenia	4
6	**Genetic basis of neoplastic disorders:** Retinoblastoma, Wilms tumor, Colectral cancer, and Blooms syndrome	6
7	Prenatal Genetic counseling	2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

8	**Gene therapy:** Principles of molecular genetic-based therapies and treatment with recombinant proteins or genetically engineered vaccines The technology of classical gene therapy Gene therapy for inherited disorders Gene therapy for neoplastic disorders The ethics of human gene therapy	7
9	**Genetic counseling risk assessment**	3
10	**Genetic counseling and ethical issues**	2
Total Lectures		**42**

Suggested Text Book(s):

1. Strachan T and Read AP (2010) Human Molecular Genetics -4, Garland Science, 4th Ed.
2. Pasternak JJ (2005) An introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases. *Hoboken (New Jersey): John Wiley & Sons*, 2nd Ed.
3. Evans C (2006) Genetic Counselling A psychological approach. New York, NY, US: Cambridge, 1St Ed.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Genetic Counseling)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	2	2	2	1	3	2	2	1	3	2.1
CO-2	2	2	3	2	2	1	-	3	2	2	1	3	2
CO-3	2	3	2	2	2	1	-	3	2	3	1	2	2
CO-4	2	3	2	2	2	2	-	3	2	3	1	2	2
Average	2.0	2.75	2.5	2	2	1.5	1	3	2	2.5	1	2.5	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

HIGHWAY CONSTRUCTION, MAINTAINANCE AND MANAGEMENT

COURSE CODE: 11B1WCE834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-2

Pre-requisite: None

Course Objectives:

1. To enhance / develop the skills of professionals working in construction and allied sectors to upgrade their skills in Construction Contracts Management and help them to grow in their career.
2. To perform different method of construction for rigid and flexible pavements based on traffic and environmental factors
3. To understand the different method of pavement repairing and maintenance
4. To develop basic understanding of the principles of pavement management

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will come to know about the types, working and importance of pavement in different condition (i.e. level or hilly terrain).	Familiarity
CO-2	Through discussion of the topic of highway construction, the students gain an appreciation for the methods and different steps involved in pavement construction.	Assessment
CO-3	Students will analyze different factors which affect the performance of pavement (i.e. environmental or traffic factor) from real-life projects and theoretical examples.	Assessment
CO-4	Students will become familier with the different methods of pavement maintenance.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Highway construction:** Introduction, history of road construction, equipments for the road construction, stages of construction, limitations in pavement construction due to weather. Earthwork: Clearing and grubbing, excavation, embankment construction, replacement of soils, soil stabilization and their types.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Flexible and Rigid pavement construction:** Flexible Pavement: different layers system and their specifications, defects in flexible pavement and their remedies, different types of pavements (i.e. dense bitumen macadam, water bound macadam etc.) and their specifications, different tests for bitumen. Rigid pavement: layer system and specifications, concrete surfacing, provision of different type of joints in rigid pavement, current practices for rigid pavement construction.	8
3	**Highway maintenance:** General, distress in pavements (Cracking, patching, rutting, pot holes, stripping and swelling), evaluation of pavement, structural evaluation, pavement maintenance.	6
4	**Introduction to transport economics:** Recycling of pavements: Introduction, selection of road for recycling, methods and equipments for recycling.	6
5	**Hill Roads:** Alignment, geometrics, design and construction for hill roads, drainage design, maintenance problems in hill roads, slope stability in hill roads, different factors responsible for pavement failure.	8
Total lectures		42

Suggested Text Book(s):

1 Hass, R., Hudson, W.R. and Zaniewski, J. "Modern Pavement Management" Krieger, 1994.

2 Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press, Taylor & Francies Group, 2006.

3 Shain, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Kluwer Academic Publishers Group, 2004.

4 Khanna, S.K. and Justo, C.E.G., "Highway Engineering" Nem Chand & Bros, Roorkee (U.A.) 8th Ed, 2005.

5 Hudson, W.R., Haas, R. and Uddin, W., "Infrastructure Management", McGraw Hill, 1997.

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	2	1	2	2	3	3	2	
CO-2	3	3	3	2	3	3	1	3	2	3	2	2	
CO-3	2	2	2	2	3	2	1	2	2	2	2	2	
CO-4	3	3	3	3	2	2	1	2	2	2	3	2	
Average													

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Infectious diseases

COURSE CODE: 18B1WBT632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Microbiology, Immunology

Course Objectives:

1. Learn to define the basic concepts related to infectious diseases, immunology and epidemiology.
2. Able to understand the basic forms, functions, behaviour, and diversity of infectious agents and their interactions with the host
3. Able to analyse the underlying principles of mode of action and resistance towards the agents used to treat infectious diseases

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The students would have knowledge of infectious diseases for practical use in medicine and biotechnology.	Familiarity
CO-2	The students would have in-depth knowledge of basic concepts related to infectious diseases, immunology and epidemiology.	Assessment
CO-3	The students would develop knowledge and understanding of the basic form, function, behavior, and diversity of infectious agents and their interaction with the host.	Assessment
CO-4	The students would develop knowledge and skill about important techniques used to study host –pathogen interactions.	Assessment/Usage
CO-5	The students would have sound knowledge of mode of action and resistance towards the agents used to treat infectious diseases.	Assessment/Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to infectious diseases Infectious and non- infectious diseases, Epidemiology of infectious diseases. Infectious agents, socio economic impact of infectious diseases	6
2	Host response to infections Bacterial, mycobacterial, viral, helminth, fungal	3
3	Biology of infectious agents Morphology, classification, life cycle, pathogenecity, mechanism of replication in bacteria, viruses, protozoa and fungal pathogens	5
4	Pathology of Infectious diseases Pathogenesis, Clinical pathology, Gross pathology, Microscopic pathology.	4
5	Biology of major Infectious diseases HIV/AIDS, Tuberculosis, malaria, dengue, West Nile virus, chikungunya virus, diarrheal diseases, sexually transmitted infections, influenza, viral hepatitis, Ebola	8
6	Diagnostic techniques for infectious diseases Immunohistology, Immunohistochemistry/In situ hybridization, Polymerase chain reaction based methods, Flow Cytometry.	5
7	Antimicrobials against infectious agents Antimicrobial agents, mechanism of action, Antibiotic resistance, various mechanisms of antibiotic resistance	5
8	Emerging infectious diseases and their Social Impact Emergenceof SARS, Zika virus, Ebola and other newly reported diseases along with their Social	

Dean (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	and Scientific Impact.	4
9	Biological Weapons Introduction, Concept and examples	2
Total Lectures	42	

Suggested Text Book(s):

1. Evolution of infectious disease. Ewald PW. Oxford University Press, New York.1994. ISBN 0-19-511139-7.
2. Emerging Infections 1. Scheld WM, Armstrong D and Hughes JM, Editors. ASM Press, Washinton, DC. 1998. ISBN 1-55581-123-3
3. Emerging Infections 2. Scheld WM, Craig WA and Hughes JM, Editors. ASM Press, Washington, DC. 1998. ISBN 1-55581-141-8.
4. Emerging Viruses. Morse SS, Editor. Oxford University Press, New York. 1993. ISBN 0-19-510-484-6.
5. Modern Infectious Disease Epidemiology: Concepts, Methods, Mathematical Models, and Public Health (Statistics for Biology and Health) Kramer; 2010

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Infectious diseases)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	3	3	3	3	3	2	2	1	3	2.6
CO-2	3	3	3	3	3	3	3	3	3	2	-	3	2.9
CO-3	1	3	3	3	1	1	3	3	3	3	-	3	2.5
CO-4	3	1	3	3	3	3	2	1	-	-	3	2	2.4
CO-5	1	2	3	3	3	2	3	3	2	2	2	2	2.3
Average	2	2.4	3	3	2.5	2.5	2.8	2.6	2.5	2.25	2	2.6	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

11B1WCI832: Information Retrieval and Data Mining

Course Credit: 3
Semester: VII

Introduction:

Data mining is an interdisciplinary subject, and more appropriately named "knowledge mining from data". However, it is also known as knowledge discovery from data (KDD).

Course Objectives (Post-conditions) Knowledge objectives:

- Good knowledge to Mine Data from Large Amount of Data Sources
- You will be able to compare a two different data set and you can find out which one is better
- You will be able to apply many retrieval techniques on a given document
- You will be able apply some pattern matching algorithm and map the various expected pattern depend upon usage requirements

Application objectives:

Data Mining and Information Retrieval have tremendous advantages in term of their application areas which include; Financial Data Analysis, Retail and Telecommunication Industries, Intrusion Detection and Prevention, Bioinformatics and many more.

Expected Student Background (Preconditions)

Database Management Concepts, Probability and Basic Mathematical Concepts

Topics Outline:

Serial No.	Topics	Hrs
1	Introduction to Data Mining	1
2	Data Preprocessing	7
3	Data Generalization, Data Warehousing, and On-line Analytical Processing	8
4	Association Rule Mining and Frequent Patterns	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Classification and Prediction	4
6	Cluster Analysis	5
7	Introduction to Information Retrieval	1
8	Boolean Retrieval	2
9	Probabilistic Information Retrieval	3
10	Vector Support Machines	3
11	Pattern Matching Algorithm	2
12	Link Analysis	2
	Total Hours = 42	

Text Book(s):

1. **Jiawei Han and Micheline Kamber, "Data Mining, Concepts and Techniques", Elsevier 2nd edition.**
2. **An introduction to Information Retrieval, 2008 Cambridge UP.**
3. **Thomas H. Corman, Charles E. Leiserson, and Ronald L. Rivest, Introduction to Algorithms,. The MIT Press,England, 1989.**

Reference Book(s):

1. **Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining ", Pearson Education.**
2. **Richard O. Duda, Peter E. Hart, David G. Stork , "Pattern Classification", 2nd Edition, Wiley Publication, November 2000.**
3. **Rijsbergen C. J. ,"Information Retrieval" 2nd edition.**

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	INTERNAL	25
		Total Marks: 100

Internal Marks Breakdown:

Assignments: 9 marks (3x3)
Quizzes: 12 marks (3x4)
Regularity: 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Course Introduction - 13B1WHS832 International Business Management

International Business and Trade is a complex system and navigating it is a challenging and exciting task. It is an integral part of the World Economic System and no country can survive without getting involved in it. Because of the forces of Globalization we cannot avoid the competition, even if we don't go out some other company from another country may come at our doorstep. Globalization of markets increases global competition and requires enterprises to continuously improve their performance to sustainably survive.

Political/Economic/Social/Technological/Environmental/Legal (PESTEL) conditions are different for different countries and it extremely important not only for managers but also for employees to understand the differences so that they can make an optimal decision.

Engineers substantially contribute to the success of an enterprise provided they understand and follow fundamental international market forces, economic basics and operational business management.
Therefore, one has to have a complete understanding of dynamics of International Business to survive successfully in the long run. The aim of the present course is to develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

13B1WHS832 International Business Management

Course Goal

To develop the understanding of the complexities of international business and trade and different factors which govern them like socio-cultural, political, economic factors etc.

Course Objectives

1. Understand different issues of International Business.
2. Analyze how different environment affects the business of a Multi National Companies.
3. Analyze the effect of changing dynamics of international business on Indian Economy.
4. Understand the importance of different theories of explaining international trade and businesses.
5. Understand the role of International Institutions in promoting and stabilizing the international integration.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

6. Design a suitable strategy for international trade, for a firm, depending upon the economic conditions of both home and host countries.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	13B1WHS832	Semester	VIII
Subject Name	International Business Management		
Credits	3	Contact Hours	3
Faculty (Names)	Coordinator(s)		
	Teacher(s) (Alphabetically)		

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction	Introduction and Basic Understandings of World Map	2
2.	Understanding Globalization	Globalization and International Business	3
3.	International Business Environment	a) Socio-Cultural Environment b) Political and Legal Environment c) Economic Environment	6
4.	International Trade and Investment Theories	a) International Trade Theories b) Foreign Exchange Markets c) Foreign Direct Investment d) Regional Economic Integrations	12
5.	Institutional Framework for International Business	a) WTO (GATT) b) The World Bank Group c) International Monetary Fund (IMF) d) UNCTAD e) Indian Institutions	9
6.	International Business Strategy	a) Organization and Strategy of International Business b) Country Evaluation and Selection c) Entry Strategy and Strategic	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • H.P.

		Alliances (includes Export-Import, Direct Investments and Collaborative Strategies)	
		Total number of Lectures	42

Evaluation Scheme		
S.No.	**Component**	**Weightage**
1.	Test – 1 (1 Hr)	15
2.	Test – 2 (1 Hr 30 mins)	25
3.	Test – 3 (2 Hrs)	35
5.	Internal • Presentation • Class Participation • Attendance	 10 10 5

Recommended Readings	
1.	International Business by Daniels, Radebaugh, Sullivan and Salwan; Pearson **(Text Book)**
2.	International Business by Hill and Jain; TMH.
3.	International Business by Czinkota, Ronkainen and Moffet; Wiley.
4.	International Business by Cherunilam; PHI
5.	International Business by Justin Paul; PHI.
6.	International Business by Rakesh Mohan Joshi; Oxford.
7.	Newspapers, magazines and internet

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

14B1WHS832 International Human Resource Management

Course Goal

This course is designed to introduce students to the nature of managing human resources in multinational firms. It explores the complexities of IHRM and distinguishes international from domestic HR practices. The purpose of the course is provide students with an in-depth understanding of the basic problems inherent in IHRM to either prepare them for further work in the IHRM field or to give them a sound basis to understand the international corporate dimensions of their own careers. This course will help students identify differences in operating a domestic versus an international business and how business practices need to be adapted to operate successfully in foreign markets.

Course Objective:

1 .Students gain insight into and appreciation for the complexities and differences of operating a business in an international context as it applies to HRM.
2. Understand human resource management systems and their main challenges in multinational companies and improve their performance accordingly,
3. Efficiently implement specific IHRM activities in multinational companies,
4. Make better strategic decisions about people in international settings and
5. Design effective IHRM systems and practices for MNCs.
6..The course also facilitates cross-cultural sensitivity, systemic thinking, context screening, and ethical behavior in international setting

Detailed Syllabi

Lecture-wise Breakup

Subject Code	14B1WHS832		**Semester**	2
Subject Name	International Human Resource Management			
Credits	3		**Contact Hours**	3
Faculty (Names)	**Coordinator(s)**	1.Dr. Tanu Sharma		
	Teacher(s) (Alphabetically)			
Module No.	**Subtitle of the Module**		**Topics**	**No. of Lectures**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Chapter	Topic		Hours
1	**Introduction** **Case** : NCR in Scotland	Defining International HRM Variables that moderate differences between domestic and international HRM Applying a strategic view of IHRM	3
2	**Internationalization of HRM :Socio-Cultural Contexts** **Case:** Oki UK ltd	National Culture and HRM HRM and its broad context National Culture and Specific HRM Issues Business imperatives and Other non – cultural influences on HRM	3
3	**National Context of HRM: case of 7 major economies** **Case** :Litton imports cell manufacturing from Sweden	Major economies and their HRM practices 1.HRM in Japan 2. HRM in the United States 3. HRM in the United Kingdom 4. HRM in Turkey 5. HRM in the Arab Middle East 6. HRM in India 7. HRM in China	5
4	**Staffing International operations for sustained global growth**	Approaches to staffing Transferring staff for international business activities The roles of an expatriate The role of expatriates Return on investment of international assignments The role of the corporate HR function in MNEs	3
5	**Recruiting and selecting staff for international assignments**	Issues in staff selection Factors moderating performance Selection Criteria Dual career couples Are female expatriates different?	3
6	**International training and development** **Case** : Seiko Instruments **Case** : Transfer of Knowledge in Oki-Training and development	The role of expatriate training Components of effective pre-departure training programmes The effectiveness of pre-departure training Developing staff through international	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

		assignments Trends in international training and development	
7	**International compensation** **Case** : News International plc	Objectives of international compensation Key components of an international compensation program Approaches to international compensation	3
8	**Re-entry and career issues**	The repatriation process Individual reactions to re-entry Multinational responses Designing a repatriation programme	3
9	**IHRM in the host country context**	Standardization and localization of HRM practices Factors driving standardization Factors driving localization Code of conduct- monitoring HRM practices in the host country Managing human resources in off shoring countrie	4
10	**International industrial relations** **Case :** Elementis and Michelin	Key issues in international relations Trade unions and international industrial relations The response of trade unions to multinationals Regional integration: the European Union	4
11	**Performance Management** **Case :** Tubular Industries Scotland Ltd.	Multinational performance management Performance management of international employees Performance appraisal of international employees	3
12	**IHRM trends: complexity, challenges and choices in the future** **Case :** Orgaon laboratories ltd, scotland	Strategic HRM: research issues and theoretical developments	3

Methodology

The format will emphasize capstone lectures, class discussion of assigned readings and other topics, in-class exercises, case analysis, and a group project.

Assistant Dean (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation :

Exam	Marks
Test 1	15
Test 2	25
Test 3	35
Case study\Assignment\Presentations	25*

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Peter J. Dowling, Marion Festing & Allen D. Engle, SR.:International Human Resource Management (fifth Edition)
2.	D. Briscoe, R. Schuler, & I. Tarique (2012). **International Human Resource Management (4th Edition).** London/New York: Routledge.
3.	Jackson, T.: **International dimensions of human resource management.** London, 2002.
4.	Dessler, G.: **Human Resource Management**. 9th ed., New York, 2003.
5.	Harzing, A. W. & Ruysseveldt, J. (2004). **International human resource management (2th Ed.).** Sage Publication: London.
6.	Briscoe, D. R., Claus , L. M., Schuler , R. S. (2009). **International human resource management: Policies and practices for multinational enterprises.** Routledge

*Break up of internal marks

Internal marks	Total \25		
	Case Study 1	10	T1 /5
	Case Study 2	10	
	Case Study 3	10	T2/5
	Case Study 4	10	
	Case Study 5	10	T3/5
	Case Study 6	10	
	Presentations	10	

Registrar (Academics)
Jaypee University of Information Technology
Solan (H.P.)

IQAC

Internet Marketing

COURSE CODE: 13B1WHS834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To develop the student's understanding on how the internet has become a necessity in modern business
2. Discover how this medium can assist in marketing. It
3. Examine the fundamental principles associated with the strategic adoption, implementation, use and evaluation of internet in organizations. Essentially, the focus is on
4. Understand how the internet can serve as an invaluable resource for the strategic business and competitive advantage.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the importance of Internet marketing	Familiarity
CO-2	Gain familiarity with fundamental marketing concepts	Assessment
CO-3	Develop Internet marketing mix	Assessment
CO-4	Evaluate modern day internet marketing technology	Usage
CO 5	To understand and decipher elements of electronic service quality and CRM	Assessment

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	**Marketing management Fundamentals:**	Concept, Segmentation, Targeting , Positioning, Marketing mix	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

2.	**Introduction to Internet marketing** Relevance of the Internet to the modern marketing concept, Internet marketing, E-marketing, E-commerce and E-business, Differences between Internet marketing and traditional marketing. Internet & different marketing functions.	3
3.	**Internet micro and macro environment** Different elements of the Internet environment - competitor, customer and intermediary use of the Internet. Changes in business models enabled by e-commerce .Legal, moral and ethical constraints and opportunities on an organization. Social media marketing	5
4.	**Internet Marketing Mix** Internet marketing strategy to marketing and business strategy ,opportunities and threats arising from the Internet, elements of the marketing mix in an online context, characteristics of an online brand	4
5.	Consumer Behavior Online Changing Patterns of Consumer behaviour,Use of Market segmentation in Consumer Behaviour, Dimensions of Consumerism, Process of Motivation	4
6.	**Interactive marketing communications** Communications characteristics between digital and traditional media, methods for online and offline promotion. Importance of integrating online and offline promotion. methods of measuring site effectiveness	4
7.	**E-service quality** Different stages involved in creating a new site or relaunching an existing site. Design elements that contribute to effective web site content.Factors that are combined to deliver an effective online customer experience.	4
8.	**Customer relationship management** Concepts of relationship direct and database marketing on the Internet, potential of the Internet to support one-to-one marketing and the range of techniques and systems available to support dialogue with the customer over the Internet.	4
	Business-to-business Internet marketing Principal uses of the Internet in business-to-business markets. Impact of Internet technologies on buyer/supplier processes, relationships and markets.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Advanced Topics SEO, SEM, TEES, Commercial aspects of Cloud Computing, Big Data & Marketing Intelligence, E-Squal, Digital India	6
Total lectures		**42**

Suggested Text Book(s):

1. E-Marketing 5/E by Judy Strauss and Raymond Frost ©2009 Pearson Education, Inc. Publishing as Prentice Hall
2. Internet Marketing: Strategy, Implementation and Practice, 3/e by Dave Chaffey
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan

Other useful resource(s):

1. http://www.digitalindia.gov.in/
2. http://www.socialbeat.in/2016/07/19/digital-marketing-industry-report-india-2016/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment :10 Class activities :10 Attendance:5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	x	2	x	x	x	x	x	x	x	1	3	1	0.58

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO2	x	2	x	x	x	x	1	x	x	x	3	1	**0.58**
CO3	x	2	3	x	2	x	x	x	3	x	3	1	**1.17**
CO4	1	2	3	2	2	x	x	x	x	x	3	1	**1.17**
CO5	x	2	x	x	x	2	1	2	3	1	3	1	**1.25**
Average	**0.20**	**2.00**	**1.20**	**0.40**	**0.80**	**0.40**	**0.40**	**0.40**	**1.20**	**0.40**	**3.00**	**1.00**	

Department of Humanities and Social Sciences

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Internet of Things Architecture and Design (OE)

15B1WCI832 - B.Tech CSE-IT 8th Semester

(Jan. – June 2016)

Instructor: Dr. Vivek Sehgal

Introduction:

The Internet of Things (IoT) is a global network that links physical objects using Cloud computing, web applications, and network communications. It allows devices to communicate with each other, access information on the Internet, store and retrieve data, and interact with users, creating smart, pervasive and always-connected environments.

Despite the Internet of Things being a relatively new concept, there are already a few open platforms available that enable remote and seamless management and visualization of sensor data: Cosm, Nimbits, and ThingSpeak are just a few examples. And Arduino works with all of them.

The Arduino is an incredibly flexible micro-controller and development environment that cannot only be used to control devices, but can also be used to read data from all kinds of sensors. Its simplicity and extensibility, in addition to its great success and adoption by users, has led to the development of a variety of hardware extensions and software libraries that enable wired and wireless communication with the Internet. Arduino is the ideal open hardware platform for experimenting with the world of the Internet of Things.

Readings:

1. Building Internet of Things with the Arduino: by CharalamposDoukas
2. Exploring Arduino: Tools and Techniques for Engineering Wizardry by Jeremy Blum
3. Getting Started with Intel Galileoby Matt Richardson
4. http://www.buildinginternetofthings.com/table-of-contents/chapter-1/
5. http://www.intel-software-academic-program.com/pages/courses#diy

Course Objectives (Post-conditions):

1. Make your Arduino with Intel Galileo talk to the world!

Knowledge objectives:

This course will provide students with all the information they need to design and create their own Internet of Things (IoT) applications using the Arduino platform.

More specifically, they will learn:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

1. About the Internet of Things and Cloud Computing concepts

About open platforms that allow students to store their sensor data on the Cloud (like Cosm, Nimbits and many more)

2. The basic usage of Arduino environment for creating their own embedded projects at low cost
3. How to connect their Arduino with their Android phone and send data over the Internet
4. How to connect their Arduino directly to the Internet and talk to the Cloud
5. How to reprogram their Arduino microcontroller remotely through the Cloud

Topics Outline:

1. **The Internet of Things**
2. **The Basics of Sensors and Actuators**
3. **An Introduction to Cloud Computing**
4. **The Arduino Microcontroller Platform**
5. **Reading From Sensors**
6. **Talking to your Android phone with Arduino**
7. **Connecting Your Arduino to The Internet**
8. **Introducing Cosm As A Cloud Service**
9. **Introducing The Nimbits Public Cloud Server**
10. **Reprogram Your Arduino Remotely From The Cloud**
11. **What One Can Connect to the Cloud: Project Ideas**
12. **Internet of Things with Intel Galileo**
13. **Mini computers for IoT**

Evaluation scheme:

For internal Assessment 3 quizes will be held. Best two will be taken with 10 marks each.

Test 1	15		
Test 2	25		
Test 3	35		
Internal	25	Attendance	-5 Marks
		Quizzes	-10 Marks
		Assignments	-10 Marks
Total	100	marks	

A student will need to get at least 22 marks out of a maximum of 75 (total) in the tests and 30 marks out of 100 in the overall total to be considered passed.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assignments

Assignment plan to include one assignment per week will be posted on the student resource separately. Students will be expected to submit the assignment as per expected time plan.

Ethics

During the course, students are expected to adhere to ethical standards expected of a professional. Any work you turn in has to be your own, written up by you personally. Honest behavior is expected at all times.

Good Luck on the course.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Machine Learning

COURSE CODE: 18B1WCI634

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
4. Be able to design and implement various machine learning algorithms in a range of real-world applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in machine learning	Familiarity
CO-2	To learn about the definition of learning systems, their goals and applications in machine learning	Familiarity
CO-3	To understand concepts associated with classification and experimental evaluation of classification algorithms	Assessment
CO-4	To learn concepts associated with decision trees and experimental evaluation of classification algorithms	Assessment
CO-5	To learn about instance-based learning, clustering and unsupervised learning	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. **Inductive Classification:** The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.	5
2	**Decision Tree Learning:** Representing concepts as decision trees. Recursive induction of decision trees. **Picking the best splitting attribute:** entropy and information gain.Overfitting, noisy data, and pruning, Linear regression	5
3	**Artificial Neural Networks:** Neurons and biological motivation. Perceptrons, Multilayer networks and back propagation. **Bayesian Learning:** Probability theory and Bayes rule. Naive Bayes learning algorithm. Logistic regression	5
4	**Support Vector Machine**, Kernel function and Kernel SVM **Instance-Based Learning:** Constructing explicit generalizations versus comparing to past specific examples. k-Nearest Neighbor algorithm. Case-based learning.	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Genetic Algorithm and Evolutionary Algorithms Introduction.** Representing hypothesis, Genetic Operators, Fitness function and selection. Hypothesis space search Genetic Programming	6
6	**Clustering and Unsupervised Learning:** Learning from unclassified data. Hierarchical Agglomerative Clustering. k-means partitioned clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.	6
Total lectures		**32**

Suggested Text Book(s):

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin.

Suggested Reference Book(s):

1. Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006
2. T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.
3. Ian H. Witten & Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufmann, 1999.
4. S. M. Weiss & C. A. Kulikowski, "Computer Systems that Learn", Morgan Kaufman Publishers, San Fancisco, CA, 1991

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs40/preview
2. Link to topics related to course:
   i. https://in.udacity.com/course/intro-to-machine-learning--ud120-india
   ii. https://www.edx.org/learn/machine-learning
   iii. https://www.datacamp.com/courses/introduction-to-machine-learning-with-r
   iv. https://www.simplilearn.com/big-data-and-analytics/machine-learning-certification-training-course

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	**3**	**3**	**3**	**2**	**2.8**	**2.8**	**2.2**	**2**	**2.2**	**3**	**1**	**3**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Modern Antennas

(Elective Subject-B.Tech)

Course Code:	13B1WEC832	Semester:	8th sem B.Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The main objective of the course is to

1. Learn the mechanism of antenna, antenna performance parameters,
2. Design and analysis of various antennas for different applications
3. Size reduction techniques, Broadbanding and multi band operation techniques in antenna design.

Course Outcomes

After studying this course the students would gain enough knowledge

1. To understand the mechanism of antenna radiation
2. To design and analyze various antennas for specific application.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction: antenna types, radiation mechanism, use of potential functions, radiated field, far field, antenna parameters, radiation pattern, directivity, numerical evaluation of directivity, gain, efficiency, impedance, loss resistance, polarization, linear polarization, circular and elliptic polarization, equivalent area, Friss equation.	Balanis: Chapter 1,2,3	6
2.	Dipole Antennas: Potential functions for analysis of radiated fields, Duality theorem, Reciprocity theorem for antennas, Radiation from current element, infinetismal dipole, finite length dipole, half wave dipole	Balanis: Chapter 4	6
3	Antenna Arrays: Analysis and Synthesis Review of antenna array basics, Linear arrays, circular array, planar (2D) arrays, sum and difference patterns, Effect of mutual couplings, Phased array antennas, scan rinciples, Non uniform arrays, Dolph Chebyshev Arrays Binomial Arrays.	Balanis: Chapter 6	6
4	Broadband and Frequency Independent Antennas Helical antenna: Normal mode and	Balanis: Chapter 10	6

Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

	axial mode helix Spiral antennas, Log Periodic antennas.		
5	Aperture Antennas Radiation from an aperture in an infinite ground plane, Radiation from rectangular and circular apertures, Radiation from a slotted rectangular waveguide Horn antennas: E plane and H plane sectoral horns, Pyramidal horn, Conical horn Reflector antennas parabolic reflector, methods of analysis, dual reflector antennas, offset reflector antenna, gain and efficiency calculations, scanning properties and cross polarization Lens antennas and their applications	Balanis: Chapter 12	7
6	Microstrip Antennas Rectangular patch antenna: cavity and transmission line models, Circular patch antenna Coupling mechanisms, circular polarization, Microstrip arrays, Broadband and Multi band microstrip antennas, Compact Microstrip Antennas.	Balanis: Chapter 14	6
7	Dielectric Resonator Antennas Introduction, radiation mechanism, advantages of DRA, types of DRA, feeding techniques, design method, modes.	Rajveer: Chapter 1, 2	6
		Total Number of Lectures	43

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
    - 10 Marks : Class performance, Tutorials & Assignments
    - 10 Marks : Quizzes
    - 5 marks : Attendance

Text Books

1. Antenna Theory Analysis and Design, C. A. Balanis, 3rd Ed, 2005, John Wiley & Sons Inc.
2. Antennas for All Applications, J. D. Kraus and R. J. Marhefka, 3rd Ed., 2002, McGraw-Hill, Inc
3. Rectangular Dielectric Resonator Antennas, Rajveer S. Yaduvanshi Harish Parthasarathy, 1st Ed, 2016, Springer.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Reference Books

1. Antennas and Radiowave Propagation, R. E. Collin, 1985, McGraw-Hill, Inc.
2. Modern Antenna Design, T. A. Milligan, 2nd Ed., 2005, John Wiley & Sons
3. Antenna Arrays, R. L. Haupt, 2010, John Wiley & Sons, Inc.
4. Antenna Theory and Microstrip Antennas, D. G. Fang, 2010, CRC Press

Assistant-Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Nano-Biotechnology

COURSE CODE: 18B1WBT633

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic of Physics, Chemistry and Biology

Course Objectives:

1. Introduction to Nanomaterial and various material used for obtaining nano-materials
2. Learn various approaches or methods used for nanomaterial synthesis.
3. To learn various analytical techniques used for nanomaterial characterization.
4. Learn various applications of nanomaterial in health care, agriculture and environmental monitoring

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduction to Nano (Basics to Nanoscience and Nanotechnology)	Familiarity
CO-2	Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterial and fundamental properties of Nano-materials(Nano-effect)	Assessment & Technical
CO-3	Introduction to various technique used for the characterization of nanostructures and nanomaterial.	Assessment & Technical
CO-4	Fundamental understanding of nanomaterial/nano-biotechnological application in health and disease.	Usage
CO-5	Fundamental understanding of nanomaterial/nano-biotechnological application in Environment and food - detection and mitigation	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction, History &Applications:**Various definitions and Concept of Nano-biotechnology & Historical background. Fundamental sciences and broad areas of Nano-biotechnology. Various applications of Nano- biotechnology, Cell – Nanostructure interactions	6
2	**Synthetic methodologies:**Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterials: Lithography method, Electrochemical method, Mechanical Method, Chemical Synthesis, Chemical vapour deposition, Molecular self-assembly, Laser Induced assembly.	10
3	**Techniques used for the characterization of nanoparticles:**Principles of microscopy-light, electron, fluorescent confocal, scanning and transmission microscopes, different fixation and staining techniques for	13
	EM. Principles of spectroscopy-UV, visible, CD, FTIR, NMR, and ESR spectroscopy, structure determination using X-ray diffraction, analysis using light scattering.	
4	**Nano-biotechnologicalapplications in health and disease:**Properties of different types of nanoparticles normally used in health and disease. Diagnostics and theranostics application of nanomaterials in health sciences.	6
	Nanobiotechnological applications in Environment andfood - detection and mitigation: Properties of different types of nanoparticles normally used in	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	environmental and food sciences. Detection and removal of toxic metal ion from polluted sample and detection and removal of pathogen form food sample.	7
Total Lectures		**42**

Suggested Text Book(s):

1. C. A. Mirkin and C. M. Niemeyer. Nanobiotechnology - II more concepts and applications. (2007) - Wiley VCH.
2. P. Boisseau, P. Houdy, M. Lahmani, Nanoscience: Nanobiotechnology and Nanobiology

Suggested Reference Book(s):

1. A. Nouailhat, An Introduction to Nanoscience and Nanotechnology, Wiley
2. D.A Phoenix, W. Ahmed, Nanobiotechnology, One Central Press Ltd, UK
3. L. Filipponi, D. Sutherland, Nanotechnologies: Principles, Applications, Implications and Hands-on Activities.Directorate- European commission

Other useful resource(s): Link to NPTEL course contents

- https://nptel.ac.in/courses/118107015/
- https://onlinecourses.nptel.ac.in/noc17_bt17/preview
- http://videos.gitam.edu/nptel/nano.html

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Course Outcomes (COs) contribution to the programme Outcomes (POs):

Course outcomes (NanoBiotech.)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	1	2	3	2	1	1	1	2	2	1.7
CO-2	2	3	2	2	3	2	2	2	1	1	3	2	2.1
CO-3	3	3	2	2	3	2	2	2	1	1	3	2	2.2
CO-4	2	2	3	3	2	3	2	2	2	2	3	2	2.3
CO-5	2	2	3	3	2	3	3	2	2	1	3	2	2.3
Average	2.2	2.4	2.2	2.2	2.4	2.6	2.2	1.8	1.4	1.2	2.8	2.0	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

11B1WCI836: Network Management

Course Credit: 3
Semester: VIII

Introduction

Network Management is becoming more and more important to Government and commercial organizations to run their IT networks in an efficient and cost effective manner. The emerging Internet based applications, such as Voice Over IP (Internet Telephony) and IP TV (Internet based TV service) and technologies such as wireless communications and so forth make network management all the more important. This course will provide an understanding of the concept, standards, products and practical methods pertaining to network management and will be helpful to students and researchers working in the field of network management.

Network management (NM) refers to all the functions, facilities, tools, communications interfaces, protocols, and human resources necessary to monitor and maintain data and communications networks and plan for their growth and evolution. NM includes investigation of day-to-day operations and administration of the networks. Within this framework, various aspects of managing voice and data networks are covered in this course. The course also covers the concepts and fundamentals of NM standards such as OSI management standards and Simple Network Management Protocol (SNMP), which is a de facto standard.

Course Objectives (Post-conditions)

Knowledge objectives:

The objective of this course is to study network management (NM) from a software developers perspective and to provide an understanding of SNMP and OSI NM standards and technologies. This course covers various aspects of NM, including NM functions, facilities, equipment, communications protocols, processes and methodologies. It also covers products and technologies that are used to manage practical networks.

By the end of this course, students will be able to:

1. Demonstrate an understanding of network management concepts, standards, and protocols including Simple Network Management Protocol (SNMP) and Open Systems Interconnection (OSI) protocols.
2. Show how to apply network management standards to manage practical networks.
3. Discuss issues and challenges pertaining to management of emerging network technologies such as wireless networks and high-speed internets, and learn approaches to manage them.
4. Demonstrate in-depth understanding of various aspects of network management and be able to design and develope an automated NM tool.

Application objectives:

1. Apply appropriate known cryptographic techniques for a given scenario. [Usage]
2. You will be able to analyze the tradeoffs of balancing key security properties.[Usage]
3 You will be able to design a security solution and do the cryptanalysis. .[Usage]

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Expected Student Background (Preconditions)

Computer Network .

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Topics Outline:

S NO	Topics	Hrs
1	Data Communications and Network Management Overview	3
2	Review of Computer Network Technology	4
3	Basic Foundations of Network management, standards, models and languages, ASN.1	3
4	SNMP v1 Organisation and Information models	4
5	SNMP v1 Communication and functional Models	4
6	SNMP v2	4
7	SNMP v3	4
8	SNMP management RMON	4
9	Network Management Tools and systems and Engineeriong	2
10	Telecommunications Management Networks	2
11	Network Management applications	2
12	Broadband Network Management: WAN ATM Networks	2
13	Broadband Network Management: Access Networks	3
14	Advanced Topics:Web Based Network Management	1
	Total	42

References

1. Mani Subramanian., Pearson Education, Network Management Principles and Practices
2. https://www.dmoz.org//Computers/Internet/Protocols/SNMP
3. http://www.snmp.com/conferences/
4. http://tools.ietf.org/html/rfc3411
5. http://tools.ietf.org/html/rfc6353
6. http://www.artechhouse.com/uploads/public/documents/chapters/pan-ch04.pdf

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	9 marks (3x3)
Quizzes	12 marks (3x4)
Regularity	4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

NGS Data Analysis and Applications

COURSE CODE: 18B1WBI834 COURSE

CREDITS: 3 CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

Course Objectives:

1. To acquire basic knowledge of Next Generation Sequencing approaches in genomic research.
2. To understand computational and statistical principles for analysing genomic data.
3. To understand and formulate questions to investigate deep sequencing data.

Course Outcomes

S.No.	Course Outcomes	Level of Attainment
CO-1	The students will acquire knowledge of Next Generation Sequencing technologies used in genomics and genetics research.	Familiarity
CO-2	The students will learn about the various platforms used in NGS.	Assessment
CO-3	The students will learn about the tools and techniques used in NGS data analysis.	Usage
CO-4	The students willknowtheapplications and scopes of genomics research using the latest genome-wide data centric approaches.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Overview of Sequencing Technologies:** Historical perspective of sequencing technologies. Overview of modern sequencing technologies. Sanger Sequencing. Next Generation sequencing platforms. Whole genome sequencing.	4
2	**Next Generation Sequencing Data analysis:** Data acquisition and base calling. Quality of sequencing data. Read mapping and genome assembly. Structural and functional annotation of genomes. Statistics and algorithms used in different steps in data analysis.	10
3	**Technologies for Transcriptomics and Regulatory Genomics:** Chip-seqAnlysis. Peak finding. Motif Discovery. RNA-seq Analysis. Differential gene expression analysis. Exome sequencing and analysis. Exome sequencing.	9
4	**Software and pipelines for NGS Data Analysis:** Chip-seq analysis Piplines. RNA-seq analysis pipelines. Software used for assembly and differential gene analysis. Basics of Genome Browsers. Annotation pipelines.	9
5	**Genome Sequencing and Applications in Genetics Studies**: Algorithms and application in studying regulation of gene expression. Emerging technologies of single cell gene expression analysis. Metagenomics. Variant detection. Time series analysis. Pathway Analysis.	10
Total lectures		**42**

Suggested Text Book(s):

1. Genomic Data Analysis by Megahed Mohammad, LAP Lambert Academic Publishing
2. Deep Sequencing Analysis by Noam Shomrom, Springer.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	2	1	2	2	2	2	1	2	2	2	2
CO-2	1	2	1	2	2	2	2	2	2	2	1	2
CO-3	2	3	3	3	3	2	3	2	2	1	2	2
CO-4	2	3	3	3	3	2	3	2	2	1	2	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

OPTICAL COMMUNICATION SYSTEMS

(Elective Subject)

Course Code:	11B1WEC834	Semester:	8th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. To introduce the concept of optical fiber communication system.
2. To make the students to know the constituents of the fiber optics communication system and optoelectronics.
3. To know the applications of fiber optics systems.

Course Outcomes

After studying this course the students would gain enough knowledge

1. Understand basics of optical communication systems.
2. The principles that govern optical communication systems.
3. Behavior of light as electromagnetic waves in different types of fibers.
4. The hardware components required to implement optical communication systems.
5. To efficiently design an optical communication system for practical purpose.
6. The practical techniques involved in optical communication systems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Fiber optics and Optoelectronics, Historical developments, Fiber optic communication system, Advantages, Emergence as a key technology, Role of Fiber optics technology.	Text Book 1, Chapter 1, Pages 1-16; Text Book 2, Chapter 1, Pages 1-11	3
2.	Ray Propagation in Optical Fibers - Introduction, review of fundamental laws of optics, Ray propagation in Step-index and Graded-index Fibers, Effect of material dispersion, The combined effect of multipath and material dispersion, Calculation of rms pulse width.	Text Book 1, Chapter 2, Pages 17-35 Text Book 2, Chapter 1, Pages 1-11	6
3	Wave propagation in Planar Waveguides- Introduction, Maxwell's equations, Solution in a inhomogeneous medium, Planar optical waveguide, TE modes of a symmetric step-index planar waveguide, Power distribution and	Text Book 1, Chapter 3, Pages 37-57;	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	confinement factor.		
4	Wave propagation in Cylindrical Waveguides- Introduction, Modal analysis of an ideal SI optical fiber, fractional modal power distribution, Graded-index fibers, Limitations of multimode fibers.	Text Book 2, Chapter 4, Pages 1-61-80	4
5	Single-mode Fibers- Introduction, Single-mode fibers, Characteristics parameters of SMFs, Dispersion in SMFs, Attenuation in SMFs.	Text Book 1, Chapter 5, Pages 83-105;	4
6	Optoelectronic Sources - Introduction, Fundamental aspects of semiconductor physics, the p-n junction, Current densities and injection efficiency, Injection luminescence and the LED, the heterojunction, LED designs, Modulation response of an LED, Injection laser diodes, Source-fiber coupling	Text Book 1, Chapter 7, Pages 147-199; Text Book 2, Chapter 15	3
7	Optoelectronic Detectors - Introduction, The basic principle of optoelectronic detection. Types of photodiodes, Photoconducting detectors, Noise considerations.	Text Book 1, Chapter 8, Pages 200-218	5
8	Optoelectronic Modulators - Introduction, Review of basic principles, Electro-optic modulators, Accousto-optic modulators, Application areas of optoelectronic modulators	Text Book 1, Chapter 9, Pages 219-246;	4
9	Optical Amplifiers - Introduction, Semiconductor optical amplifiers, Erbium-doped fiber amplifiers, Fiber Raman amplifiers, Application areas of optical amplifiers	Pages 247-272; Text Book 2, Chapter, Pages	5
10	Wavelength-division Multiplexing - Introduction, The concepts of WDM and DWDM, Passive components, Active components.	Text Book 1, Chapter 11, Pages 248-23;	3
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

- 10 Marks : Class performance, Tutorials & Assignments
- 10 Marks : Quizzes
- 5 marks : Attendance

Text Books

1. Fiber Optics and Optoelectronics, R.P. Khare Oxford University Press.
2. Fiber Optic Communication Systems, G. P. Agarwal, Third Edition, Wiley.

Reference Books

1. Optical Communication- principles and practice, John M Senior, Third edition, Pearson India.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

SOFT COMPUTING TECHNIQUES

(Elective Subject)

Course Code:	13B1WEC831	Semester:	8th Semester, B. Tech (ECE), M.Tech(Ist year)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes

Upon completion of the course, the student are expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to fuzzy set theory: Probabilistic reasoning, Fuzzy sets, mathematics of fuzzy set theory, operations on fuzzy sets, comparision of fuzzy and crisp set theory.	Ross Ch 1,2 Sivanandam Ch 7,8	4
2.	Fuzzy mapping: one to one mapping, max-min principle, extension principle, implication rules – mamdani implications. Membership functions: Universe of discourse, mapping inside fuzzy domain, fuzzy membership mapping methods, and application to real world problems.	Ross Ch 2,3 Sivanandam Ch 9,10	10
3	Artificial Neural Networks (ANN) and their biological roots and motivations. Comparison	Sivanandam Ch1,2	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Between Artificial and Biological Neural Networks, Applications of Neural network. Network Architecture ,Taxonomy of neural networks: feed forward and recurrent networks with. Merits and limitations of neurocomputing.	Haykin Ch1,2	
4	Types of learning, supervised and unsupervised learning laws . Learnig Laws : Hebb's rule, Delta rule, Widrow - Hoff (The Least-Mean-Square) learning rule, correlation learning rule, instar and outstar learning rules, Competitive learning, Credit Assignment Problem, Error Correction learning, Memory based learning, , Boltzmann learning.	Sivanandam Ch 3 Haykin Ch 3,4	10
5	The Perceptron and its learning law, Classification of linearly separable patterns, Multi-Layer Perceptron, Supervised Learning, Back-Propagation Learning law. Feed forward networks, Recurrent Networks.	Sivanandam Ch 3 Haykin Ch 4	6
6	Winner takes-all Networks, Competitive Learning, Kohonen's Self organizing Maps, Introduction to Adaptive Resonance Theory.	Sivanandam Ch 5	4
		Total Number of Lectures	44

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance &Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1.Simon Haykin, "*ArtificialNeutral Networks*".
2. Yegna Narayanan, *"Artificial Neural Networks"*.
3. Timothy J. Ross, " *Fuzzy Logic with Engineering Applications*".
4. S.N.Sivanandam, S.N Deepa, "*Principles of Soft Computing*"

Reference Books

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Bart Kosko, "Neural Network and Fuzzy Systems: A Dynamic System Approach to Machine" Prentice-Hall 1998
2. L. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications", Prentice-Hall, 1994
3. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002.

ONLINE MATERIAL

http://nptel.ac.in/courses/117105084/

http://nptel.ac.in/courses/108104049/

IQAC

Software Reliability

Course Code: 18B1WCI834
Course Credits: 3-0-0
Instructor: Sh. Prateek
Elective: CS/IT

Course Outcomes (COs):

Sr No	Course Outcomes	Level of Attainment
CO-1	To have an understanding of the terminology, the process of the software reliability Engineering	Familiarity
CO-2	To understand the various models of software reliability	Assessment
CO-3	To understand the metrics used for software reliability and maintainability	Assessment
CO-4	To understand the fault detection and correction approaches used in developing a quality software	Assessment
CO-5	To understand the design principles for achieving higher reliable software system.	Assessment
CO-6	To know how to improve reliability during the various stages of the software development life cycle	Assessment

Course Outline:

Modules	Contents	Lectures required
Module-1	Overview of software reliability engineering • Introducing the course. • What is software reliability? • What factors affect software quality? • What is software reliability engineering? Software Size • Software size • Size: Length (code, specification, design) • Size: Reuse • Size: Functionality (function point, feature point, object point, use-case point) Size: Complexity	6
Module-2	Software Cost and Effort • Software cost model • COCOMO and COCOMO II • Constraint model • Software lifecycle management (SLIM) • Cost models: advantages and drawbacks	6

Registrar (Academics)
Waknaghat, Distt. Solan (H.P.)

IQAC

	Software Quality • Software quality • Software quality models: Boehm model, McCall model, ISO 9126 model, etc. • Software quality standards and metrics • Measuring customer satisfaction • Software quality assurance (SQA) • Software quality management	
Module-3	Overview of Software Reliability Engineering • Hardware and software reliability • The SRE process System reliability • System reliability • Reliability Block Diagram (RBD) • Serial and parallel configuration • Active redundancy • Hazard analysis: FMEA, FTA	**8**
Module-4	Strategies to meet reliability objective • Fault prevention strategy: software product and process improvement using ISO 9000-3. • Introducing fault tolerance concepts and definitions. Coincident, correlated and dependent faults. • Fault tolerance phases. • Recovery block mechanism and Acceptance testing. • Exception handling, expected and unexpected events. • Construction of robust software systems. • Defensive programming, dual software technique. • Adjudication by voting. • Recovery blocks, N-version programming, Consensus recovery block, Acceptance voting, N self-checking programming.	**6**
Module-5	Developing operational profiles • Defining function, operation, run, run type, operational mode, operational profile. • Representation of operational profile. • Procedure to define operational profile. • Create functions/operations list. • Determine occurrence rate of individual operations. • Determine occurrence probabilities.	**8**
Module-6	• Preparing and executing test • Software reliability tools • Applying failure data to guide decisions • Deploying software reliability engineering • SRE for Agile development • Clean room software development	**8**
	Total	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-PO Articulation												
Srl	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	2	1	2	1	2	1	1	1	0	0	1
CO-2	3	3	3	3	2	3	2	1	2	0	0	2
CO-3	3	3	3	3	2	3	2	1	2	0	0	2
CO-4	3	3	3	3	2	3	2	1	2	0	0	2
CO-5	3	3	3	3	2	3	2	1	2	0	0	2
CO-6	3	3	3	3	2	3	2	1	2	0	0	2
%	89	83	72	61	67	83	56	78	0	0	0	67

CO- PSOs Articulation					
Sr No	PSO-1	PSO-2	PSO-3	PSO-4	
CO-1	2	2	2	2	79
CO-2	3	3	3	3	79
CO-3	3	3	3	3	81
CO-4	3	3	3	3	75
CO-5	3	3	3	3	79
CO-6	3	3	3	3	79
Average Score	81	82	85	76	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Software Testing Fundamentals

COURSE CODE: 18B1WCI633

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: C/C++, Python, Eclipse, Netbeans

Course Objectives:

1. Employ correct testing terminology throughout the testing process
2. Execute specific software tests with well-defined objectives and targets.
3. Modelling techniques: UML: FSM and State charts, combinatorial design; and others.
4. Apply various testing techniques, including domain, code, fault, usage and model-based.
5. Perform a complete testing process, taking into account practical considerations.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.	Familiarity
CO-2	Implement various test processes for quality improvement.	Assessment
CO-3	Design test planning and manage the test process.	Assessment
CO-4	Apply the software testing techniques in commercial environment.	Assessment
CO-5	Design test adequacy assessment and enhancement criteria.	Assessment
CO-6	Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Error, Fault, Failure, Test automation and the importance of testing, Developer and tester as two roles, Principles of Testing, ETVX Model, Testing Maturity Model, V-Model, Software quality, Testing and debugging (preparing, Constructing, Executing, Specifying, Assessing a test plan), test Generation Strategies, Types of testing and Classifiers C1, C2, C3, C4, and C5, Static testing **Preliminaries mathematical:** Predicates and Boolean Expressions, Control Flow Graph, Program Dependence Graph, Strings languages and regular expressions,	6
2	**Test Generation:**	10
	a) **From Domain Partitioning:** The test selection problem, Equivalence partitioning, Boundary value analysis, Category- partition method, Cause-effect graphing. b) **From Finite State Models**: Finite State machines, Conformance testing, A Fault model, Characterization Set, The w-Method, The partial W-methos. c) **From Combinatorial design**: Combinatorial designs, A combinatorial test design process, Fault model, Latin Squares, Mutually orthogonal Latin squares, Pairwise designs: binary factors, Pairwise design: multi-valued factors, Orthogonal	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Arrays.	
3	**Test Adequacy Assessment and Enhancement:** a) **Using Control flow:** Test adequacy basics, adequacy criteria based on control flow – Statement coverage, Decision coverage, condition coverage, MCC, LCSAJ, basis path coverage, b) **Using data Flow:** Definitions, C-use, p-use, Data flow graphs, du-path, dc-path, c-use coverage, p-use coverage, All-use coverage, k-dr chain coverage. c) **Using Mutation:** Mutation and Mutants, Test Assessment using mutation, Mutation operators, Founding principles of mutation testing, Equivalent mutants, Fault detection using mutation, Types of mutants.	8
4	**Phases of testing I:** **Regression testing:** Regression test process, Regression test selection, Selecting regression tests, test selection using execution trace, test selection using dynamic slicing	4
5	**Phases of testing II:** Unit Testing, Integration Testing, System testing, Acceptance testing.	4
Total lectures		**32**

Suggested Text Book(s):

1. "Foundations of Software testing," 2nd edition by Aditya P mathur, Pearson 2013
2. "Practical Software testing," 8th edition by Ilene Burnstein, Springer 2010

Suggested Reference Book(s):

1. Paul C. Jorgensen, Software testing: a Craft"s man approach, CRC Press
2. Srinivasan Desikan and G. Ramesh, Software Testing: Principles and Practices, Pearson Education
3. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.
4. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
5. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
6. Roger S. Pressman, "Software Engineering – A Practitioner"s Approach", Fifth Edition, McGraw- Hill International Edition, New Delhi, 2001.
7. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
8. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2003.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106105150/
2. Link to topics related to course:
   i. https://www.guru99.com/software-testing.html
   ii. https://www.inf.ed.ac.uk/teaching/courses/st/2011-12/Resource-folder/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Software Testing Fundamentals)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

UNDERSTANDING INIDA: LITERARY REFLECTIONS

COURSE CODE: 18B1WHS636

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite : None

Course Objectives:

1. To understand migration and its impact on individuals.
2. To recognize the impact of displacement on individuals.
3. To explore social, economic, cultural and geographical contexts and its relevance for a holistic living.
4. To look for roots and connections in literature with focus on environment and peace in society.
5. To access the impact of gender on migration.
6. To define identity and what it means in the modern context.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
1	Analyze the reason and impact of migration and displacement	Familiarity
2	Explore and understand the socio-cultural and geographical contexts for a holistic living	Assessment
3	Demonstrate familiarity with gender issues	Assessment
4	Understanding the links and connections in construction of identity	Usage
5	Apprise the students with socio-cultural concepts and historical events like Dalit literature, Bhakti Radicals and Partition literature respectively	Familiarity

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Modern Literature	• Cross-cultural Reflections in Vinay Rai's "A Rainbow of Contradictions" and "The Multitasking Indian" from *Think India*	3
2.	From other Margins (Regional environment/ecology, traditions, folklores)	• Mamang Dai's "Sorrow of Women" and "An Obscure Place" • Sanjoy Hazarika's "There are No Shangri-Las Left"	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3.	Indian Culture, tradition and societal norms	• Rajiv Malhotra's "Indian Comfort with Chaos" and "Western Joker and Indian Clown" from *Being Different: An Indian Challenge to Western Universalism*	8
4.	Views on Education, Indian ethos, identity and rural development	• S. Radhakrishnan's "The Adaptive Culture" and "Of One Mind" from *The Adaptive Indian: Identity and Ethos*	4
6.	Partition Literature: Migration and Identity	• Jhumpa Lahiri's "The Triangle", "The Second Exile" and "The Wall" from *In Other Words* • Ismat Chugtai's *Roots*	8
7.	Bhakti Radicals and Dalit Literature: Human Rights in India against caste system	• The Bhakti Radicals and Untouchability by Gail Omvedt from *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India* • Introduction to Dalit Movement; *Karukku* by Bama	3
		Total number of Lectures	42

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)

1.	Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism*. Harper Collins: Noida, 2013
2.	Radhakrishnan, S. *The Adaptive Indian: Identity and Ethos*. Orient Paperbacks: New Delhi, 2013
3.	Lahiri, Jhumpa. *In Other Words*. Penguin: New Delhi, 2017
4.	Bhagavan, Manu and Anne Feldhaus.Eds. *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India*. OUP: New Delhi, 2008.
5.	Asaduddin, M. *Ismat Chugtai: Lifting the Viel*. Modern Classics. Penguin: New Delhi, 2009

Evalution Scheme:

S.No.	Exam	Marks	Duration	Coverage/ Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire	Assignment -6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

			Semester	Group Discussions -6 Presentations -8 Class Assessment -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Understanding India: Literary Reflections)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	2	1	3	3	2	2	2	3	2.0
CO-2	1	3	3	3	3	1	1	3	2	2	1	3	2.1
CO-3	1	2	2	2	3	2	2	3	2	2	1	3	2.0
CO-4	1	3	3	3	2	3	3	3	2	3	2	3	2.5
CO-5	1	3	3	3	2	3	3	3	2	3	1	3	2.5
Average	1	2.6	2.6	2.6	2.4	2	2.4	3	2	2.4	1.4	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Jaypee University of Information Technology, Waknaghat

COURSE DESCRIPTION

Course Name:	Wireless Sensor Networks: Protocols and Applications
Course Code:	15B1WCI831
Course Credits:	3 (3-0-0)
Branch and Semester:	2nd Semester [ECE, CSE, IT, BI]
Session:	Jan – Jun, 2016
Faculty Coordinators:	Dr. Yashwant Singh

Description & Rationale:

Wide range of applications such as disaster management, military and security have fuelled the interest in sensor networks during the past few years. Sensors are typically capable of wireless communication and are significantly constrained in the amount of available resources such as energy, storage and computation. Such constraints make the design and operation of sensor networks considerably different from contemporary wireless networks, and necessitate the development of resource conscious protocols and management techniques. This course provides a broad coverage of challenges and latest research results related to the design and management of wireless sensor networks. Covered topics include network architectures, node discovery and localization, deployment strategies, node coverage, routing protocols, medium access arbitration, fault-tolerance, and network security.

Learning Outcome:

By the completion of the course, you should be able to:

- Architect sensor networks for various application setups.
- Explore the design space and conduct trade-off analysis between performance and resources.
- Assess coverage and conduct node deployment planning.
- Devise appropriate data dissemination protocols and model links cost.
- Determine suitable medium access protocols and radio hardware.
- Prototype sensor networks using commercial components.
- Provision quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints.
- Evaluate the performance of sensor networks and identify bottlenecks.
- Explore Security, routing Protocol and information Fusion in WSN.

Maintenance of Records:

Students are expected to keep records of labwork and homework assignments (to be posted on students resource from time to time) neatly in suitable hard bound notebooks separately (one for each). The same will be submitted to the TA in the Lab on or before the scheduled time.

Data Structures Group: Dr. Yashwant Singh, Dr. Hemrj Saini, Dr. Ravindara Bhatt

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Teaching and Learning Strategies:

Delivery consists of a series of lectures that introduce and develop the core principles. These are further explored and expanded through a series of practical-based sessions. A project problem is to be taken up and implemented as a continuous assessment in the semester to give a hands-on exposure on integrating various concepts taught and integrating them into a problem solving exercise.

The students are expected to spend time on unsupervised self-study and practical work. The course is structured so that each unit builds upon previous knowledge. Programming and implementation on different topics will be available that will be implemented in the semester.

Pre-requisites:

- Introduction to Computer Networks

Tools and Technologies:

C / C++ , Java, NS-2, Matlab etc.

Evaluation Components:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	Test-1	15	1 hour.	Syllabus covered upto Test-1
2	Test -2	25	1.5 hours	Syllabus covered upto Test-2
3	Test -3	45	2 hours	Syllabus covered upto Test-3
3.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (5) - 9 Quizzes (5) -12 Attendance - 4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Wireless Sensor Networks: Protocols and Applications (15B1WCI831)) IT	Level of Attainment	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	Weightage
1. To architect WSN for various application setups	Familiarity	H	H	H	M	M	H	H	H	M	M	87%
2. To explore the design space and conduct trade-off analysis between performance and resources.	Familiarity	H	H	H	M	M	H	H	H	M	H	90%
3. To assess coverage and conduct node deployment planning.	Usage	H	H	H	M	M	H	M	H	M	H	87%
4. To devise appropriate data dissemination protocols and model links cost.	Usage	H	H	H	M	M	H	H	M	H	H	90%
5. To determine suitable medium access protocols and radio hardware.	Usage	H	H	H	M	H	M	H	M	M	M	83%
6. To create prototype wireless sensor networks using simulator.	Assessment	H	H	H	H	M	H	H	M	M	M	87%
7. To provision quality of service, fault-tolerance, security and other dependability requirements while coping with resource constraints.	Assessment	H	H	H	M	M	H	H	H	H	M	90%
8. To evaluate the performance of sensor networks and identify bottlenecks.	Assessment	H	H	H	H	M	H	H	H	M	H	93%
9. To Explore Security node clone attack, opportunistic routing Protocol and information Fusion in WSN.	Assessment	H	H	H	M	M	H	H	H	M	M	87%
Weightage		100%	100%	100%	74%	70%	96%	96%	89%	74%	82%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

S.No.	Topics	Hrs.
1	Introduction to WSN, Applications of WSN, Challenges for WSN, Why Sensor Networks different, Enabling technologies for WSN	3
2	Architectures: Single Node Architectures, Hardware Components, Energy Consumption of Sensor node, operating System and execution environment.	3
3	Network Architectures: Sensor networks Scenario, Optimization Goals and figures of merits, Design Principles of WSN, Service interface of WSN.	3
4	Communication Protocol: Physical Layer introduction. Wireless Channel and communication fundamentals, physical layer and transeceiver design consideration in WSN	3
5	MAC Protocols: Fundamental of MAC protocols, Low duty cycle protocols, Contention based protocol, schedule based protocols, IEEE802.15.4 MAC Protocol.	4
6	Link Layer Protocols: Fundamentals, Tasks and requirements, Error control, Framing, Link Management.	3
7	Naming and Addressing: Fundamentals, Address and name management in WSN, Assignment of MAC addresses	3
8	Time Synchronization: Introduction, protocol based on sender/receiver synchronization	3
9	Localization and Positioning: properties of localization and positioning problems, single hop localization, multihop localization, etc.	3
10	Topology Control: Motibvation and basic idea, power control, clustering etc.	3
11	Routing Protocol: Energy efficient, unicast, broadcast, Opportunistic routing etc.	3
12	Data centric and content based networking: data centric routing, Data Aggregation, data centric storage.	3
13	Transport layer and QoS: Coverage and deployment, reliable data Transport, packet delivery, block delivery.	3
14	Advanced topics	2
	Total	**42**

Text Book(s):

T1: **Protocols and Architectures for Wireless Sensor Networks**
Holger Karl, Technical University of Berlin
Andreas Willig, University of Potsdam
Wiley, ISBN: 0-470-09510-5, June 2005
T2: **Wireless Sensor Networks**
Cauligi S. Raghavendra, University of Southern California
Krishna Sivalingam, University of Maryland Baltimore County
Taieb M. Znati, University of Pittsburg

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Springer, ISBN: 1-4020-7883-8, August 2005

Reading Assignments (Tentative)

1. Y. Sun, O. Gurewitz, and D. B. Johnson, " RI-MAC: a receiver-initiated asynchronous duty cycle MAC protocol for dynamic traffic loads in wireless sensor networks ," in the *Proceedings of the 6th ACM Conference on Embedded Network Sensor Systems (SenSys'08)*, Raleigh, NC, November 2008.
2. M. Sha, G. Xing, G. Zhou, S. Liu, and X. Wang " C-MAC: Model-driven Concurrent Medium Access Control for Wireless Sensor Networks ," in the *Proceedings of the 28th IEEE Conference on Computer Communications (INFOCOM 2009)*, Rio de Janeiro, Brazil, April 2009.
3. O. Farrag, M. Younis and, W. D'Amico " MAC Support for Wireless Multimedia Sensor Networks ," in the *Proceedings of the IEEE Global Communications Conference (GLOBECOM 2009)*, Honolulu, Hawaii, November 2009.
4. I. Rhee, A. Warrier, M. Aia, J. Min, " Z-MAC: a hybrid MAC for wireless sensor networks ," in the *Proceedings of the 3rd ACM Conference on Embedded Networked Sensor Systems (Sensys 2005)*, November 2005.
5. G. Jolly and M. Younis, " An Energy Efficient, Scalable and Collision less MAC layer Protocol for Wireless Sensor Networks ," *Journal of Wireless Communications and Mobile Computing*, Vol. 5, No. 3, pp. 285-304, May 2005.
6. A. A. Syed, W. Ye, and J. Heidemann, " Comparison and Evaluation of the T-Lohi MAC for Underwater Acoustic Sensor Networks ," *IEEE Journal of Selected Areas in Communication*, Vol. *26*, No. 12, pp. 1731-1743, December 2008.
7. O. Younis and S. Fahmy, " Distributed Clustering in Ad-Hoc Sensor Networks: A Hybrid, Energy-Efficient Approach ," in the *Proceedings of the 23rd INFOCOM 2004*, Volume 1, 7-11 March 2004.
8. M. Youssef, A. Youssef, M. Younis, " Overlapping Multihop Clustering for Wireless Sensor Networks ," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 20, No. 12, pp.1844-1856, Dec. 2009.
9. C.-Y. Chen and C. Wen, " Distributed clustering with directional antennas for wireless sensor networks ," *IEEE Sensors Journal*, Vol. 13, No. 6, pp.2166–2180, 2013.
10. Z. Zhou, J.-H. Cui and S. Zhou, " Efficient Localization for large scale underwater sensor network ," *Journal of Ad-Hoc Networks*, Vol. 8, No. 3, pp. 267-279, May 2009.
11. M. Youssef, M. Mah, and A. Agrawala, " Challenges: Device-free Passive Localization for Wireless Environments ," in the*Proceedings of the 13th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom'07)*, Montreal, QC, Canda, September 2007.
12. S. Lederer, Y. Wang, and J. Gao, " Connectivity-Based Localization of Large Scale Sensor Networks with Complex Shape ," in the*Proceedings of the 27th IEEE Conference on Computer Communications (INFOCOM 2008)*, Phoenix, AZ, April 2008.
13. Y. Xu, J. Heidemann, and D. Estrin, " Geography-informed energy conservation for ad hoc routing ," in the *Proceedings of the 7th Annual ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom '01)*, Rome, Italy, July 2001.
14. C. Intanagonwiwat, R. Govindan, and D. Estrin, " Directed Diffusion: A Scalable and Robust Communication Paradigm for Sensor Networks ," *in the Proceedings of the Sixth Annual International Conference on Mobile Computing and Networks (MobiCom '00)*, August 2000.
15. H. Kim, T. Abdelzaher, and W. Kwon, " Minimum-energy asynchronous dissemination to mobile sinks in wireless sensor networks ," in the *Proceedings of the 1st ACM conference on Embedded networked sensor systems (Synsys'03)*, Los Angeles, CA, November 2003.
16. U. Lee, et al., " Pressure Routing for Underwater Sensor Networks ," in the *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March. 2010.
17. Y. Yu, D. Estrin, and R. Govindan, " Geographical and Energy-Aware Routing: A Recursive Data Dissemination Protocol for Wireless Sensor Networks ," *UCLA Computer Science Department Technical Report, UCLA-CSD TR-01-0023*, May 2001.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

18. T. He et al., " SPEED: A stateless protocol for real-time communication in sensor networks ," in the *Proceedings of International Conference on Distributed Computing Systems*, Providence, RI, May 2003.
19. V. Shnayder, M.Hempstead, B. Chen, G. W. Allen, and M. Welsh, " Simulating the Power Consumption of Large-scale Sensor Network Applications ," in the *Proceedings of the 2nd International Conference on Embedded Networked Sensor Systems (SenSys'04)*, Baltimore, MD, November 2004.
20. N. Ramanathan, K. Chang, R. Kapur, L. Girod, E. Kohler, and D. Estrin, " Sympathy for the Sensor Network Debugger ," in the *Proceedings of the 3rd International Conference on Embedded Networked Sensor Systems (SenSys'05)*, San Diego, California, November 2005.
21. L. Girod, J. Elson, A. Cerpa, T. Stathopoulos, N. Ramanathan, and D. Estrin, " EmStar: a software environment for developing and deploying wireless sensor networks ," in the *Proceedings of the USENIX Annual Technical Conference (ATEC'04)*, Berkeley, California, 2004.
22. Y. T. Hou, Y. Shi, H. D. Sherali and S. F. Midkiff, " Prolonging Sensor Network Lifetime with Energy Provisioning and Relay Node Placement ," in the *Proceedings of the 2nd Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks*, Santa Clara, California, September 2005.
23. R. Falcon, X. Li and A. Nayak, " Carrier-based Focused Coverage Formation in Wireless Sensor and Robot Networks ," *IEEE Transactions on Automatic Control*, Vol. 56 No. 10, pp. 2406 – 2417, 2011.
24. G. Wang, G. Cao, and T. La Porta, " Movement-Assisted Sensor Deployment ," in the *Proceedings of 23rd IEEE INFOCOM*, Hong Kong, March 2004.
25. S. Lee and M. Younis, " EQAR: Effective QoS-Aware Relay Node Placement Algorithm for Connecting Disjoint Wireless Sensor Sub-networks ," *IEEE Transactions on Computers*, Vol. 60, No 12, pp. 1772-1778, November 2011.
26. A. Abbas and M. Younis, " Establishing Connectivity among Disjoint Terminals Using a Mix of Stationary and Mobile Relays Computer Communications ," *Computer Communications*, Vol. 36, pp. 1411–1421, 2013.
27. A. Abbasi, M. Younis, and U. Baroudi, " Restoring Connectivity in Wireless Sensor-Actor Networks with Minimal Topology Changes ," *IEEE Transactions on Vehicular Technology*, Vol. 62, No. 1, pp. 256-271, January 2013.
28. A. Perrig, R. Szewczyk, V. Wen, D. Culler, and J.D. Tygar, " SPINS: Security Protocols for Sensor Networks ," in the *Proceedings of 7th Annual International Conference on Mobile Computing and Networks (MOBICOM 2001)*, Rome, Italy, July 2001.
29. S. Zhu, S. Setia, and S. Jajodia, " LEAP: Efficient Security Mechanisms for Large-Scale Distributed Sensor Networks ," in the *Proceedings of the 10th ACM Conference on Computer and Communications Security (CCS '03)*, Washington D.C., October, 2003.
30. M. Younis, K. Ghumman and M. Eltoweissy, " Key Management in Wireless Ad Hoc Networks: Collusion Analysis and Prevention ," in the *Proceedings of the 24th IEEE International Performance, Computing, and Communications Conference (IPCCC'05)*, Phoenix, Arizona, April 2005.
31. M. Younis, O. Farrag, and B. Althouse, " TAM: A Tiered Authentication of Multicast Protocol for Ad-Hoc Networks ," *IEEE Transactions on Network and Service Management*, Vol. 9, No. 1, pp. 100-113, March 2012.
32. Y. Li and J. Ren " Source-Location Privacy through Dynamic Routing in Wireless Sensor Networks ," in the *Proceedings of IEEE INFOCOM 2010*, San Diego, California, March 2010.
33. Z. Ren, and M. Younis, " Exploiting Architectural Techniques for Boosting Base-station Anonymity of Wireless Sensor Networks ," *International Journal of Sensor Networks*, Vol.11, No.4, pp.215 – 227, 2012.

Interesting Articles

- Overview & Technical insight:
- F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E.Cayirci, "Wireless sensor networks: a survey," *Computer Networks*, Vol. 38, No. 4, pp. 393—422, 2002.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

- D. Culler, D. Estrin and M. Srivastava, "Overview of Sensor Networks," *IEEE Computer Magazine*, August 2004.
- Chee-Yee Chong; Kumar, S.P., "Sensor networks: Evolution, opportunities, and challenges," *Proceedings of the IEEE*, August 2003.
- J. A. Stankovic, T. Abdelzaher, C. Lu, L. Sha, J. Hou, "Real-Time Communication and Coordination in Embedded Sensor Networks," *Proceedings of the IEEE*, Vol. 91, No. 7, pp. 1002-1022, July 2003.
- Deborah Estrin, David Culler, and Kris Pister, "Connecting the Physical World with Pervasive Networks," *IEEE Pervasive Computing*, Vol. 1, No.1 January-March 2002.
- S. Tilak, N. B. Abu-Ghazaleh, and W. Heinzelman, "A taxonomy of wireless microsensor network models," *ACM Mobile Computing and Communication Review (MC2R)*, Vol. 6, No. 2, pp. 1-8, 2002.
- L. Schwiebert, S. Gupta and J. Weinmann, "Research Challenges in Wireless Networks of Biomedical Sensors," *ACM Mobicomm 2001*, pp. 151-165, 2001.
- J.M. Kahn, R. Katz, K. Pister, "Emerging Challenges: Mobile Networking for "Smart Dust," *J. Communications and Networks,* Vol. 2, No. 3, Sept. 2000.
- G. J. Pottie and W. J. Kaiser, "Wireless integrated network sensors," *Communications of the ACM*, Vol. 43, No. 5, pp. 51-58, 2000.
- D. Estrin, R. Govindan, J. Heidemann, and S. Kumar, "Next century challenges: Scalable coordination in sensor networks," in: *Proceedings of the 5th IEEE/ACM Annual Conference on Mobile Computing and Networks (MobiCOM'99),* Seattle, WA, August 1999.
- http://www.extremetech.com/article2/0,1697,1744363,00.asp
- http://www.eetimes.com/story/OEG20030221S0018
- Underwater Sensor Networks: http://www.ece.gatech.edu/research/labs/bwn/UWASN/publication.html

Applications and Experiments:

- Jeongyeup Paek and Krishna Chintalapudi and John Cafferey and Ramesh Govindan and Sami Masri, "A Wireless Sensor Network for Structural Health Monitoring: Performance and Experience," in the*Proceedings of the Second IEEE Workshop on Embedded Networked Sensors (EmNetS-II)*, Syndney, Australia, May 2005.
- K. Martinez, J. Hart and R. Ong, "Environmental Sensor Networks," *IEEE Computer Magazine*, August 2004.
- S. Brennan, A. Mielke, D. Torney and A. Maccabe, "Radiation Detection With Distributed Sensor Networks," *IEEE Computer Magazine*, August 2004.
- M. Maroti, G. Simon, A Ledeczi and J. Sztipanovits, "Shooter Localization in Urban Terrain," *IEEE Computer Magazine*, August 2004.
- R. Szewczyk, A. Mainwaring, J. Polastre and D. Culler, "An Analysis of a Large Scale Habitat Monitoring Application," *Proceedings of ACM SenSys*, November 2004.
- K. Mechitov, W. Kim, G. Agha, and T. Nagayama, "High-Frequency Distributed Sensing for Structure Monitoring," *Proceedings of the First International Conference on Networked Sensing Systems*, Tokyo, Japan, June 2004.
- A.Mainwaring, R. Szewczyk, D. Culler, J. Anderson "Wireless Sensor Networks for Habitat Monitoring" *Proceedings of the ACM International Workshop on Wireless Sensor Networks and Applications (WSNA)*, 2002.

Security:

- A. Perrig, J. Stankovic, D. Wagner, "Security in Wireless Sensor Networks," *Communications of the ACM*, June 2004.
- D. Carman, P. Kruus, and B. Matt, "Constraints and Approaches for Distributed Sensor Networks Security," *NAI Technical Report #00-010*, Sep. 2000.
- C. Karlof and D. Wagner, "Secure Routing in Wireless Sensor Networks: Attacks and Countermeasures," *Elsevier's AdHoc Networks Journal, Special Issue on Sensor Network Applications and Protocols*, vol. 1, pp 293-315, 2003.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

- A. Woods and J. A. "Stankovic, Denial of Service Attacks in Sensor Networks," *IEEE Computer*, October 2002, pp. 54-62.

Class Project Topics

Interesting Research Links

- ANRG Sensor Networks Bibliography
- Networked & Embedded Systems Laboratory (NESL) at UCLA
- Intel Research Labs: Sensor Nets / RFID
- National Institute of Standard and Technology
- Sensor body network
- Sensor networks research group

A. Course Material:

Lecture presentations, assignments and practicals, will be posted on the student resource from time to time. In addition following additional online/downloadable resources will be useful.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Programme Outcomes :

PO-1: Ability to acquire and apply knowledge of science and engineering fundamentals in problem solving.
PO-2: Acquire in-depth technical competence in a specific information technology discipline.
PO-3: Ability to undertake problem identification, formulation and providing optimum solution .
PO-4: Ability to utilize systems approach to design and evaluate operational performance.
PO-5: Understanding of the principles of inter-disciplinary domains for sustainable development.
PO-6: Understanding of professional & ethical responsibilities and commitment to them.
PO-7: Ability to communicate effectively, not only with engineers but also with the community at large.
PO-8: Ability to function effectively as an individual and in a group with the capacity to be a team leader.
PO-9: Understanding of the social, cultural, global and environmental responsibilities as a professional engineer.
PO-10: Recognizing the need to undertake life-long learning, and possess/acquire the capacity to do so.

****

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Database Management Systems

COURSE CODE: 18B11CI313

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Introduction to Computer Programming, Discrete Mathematics, Data Structures

Course Objectives:

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database.
3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Explain the characteristics, architecture of database approach, its components, different data models and the examples of their usage.	Familiarity
CO-2	For a given query write relational algebra expressions for that query and optimize the developed expressions.	Usage
CO-3	For a given specification of the requirement, design the databases using E-R method and normalization.	Usage
CO-4	Determine the functional dependency between two or more attributes, compute the closure of a set of attributes, evaluate a proposed decomposition	Assessment
CO-5	Give examples of the application of primary, secondary, and clustering indexes, explain the theory and application of internal and external hashing techniques.	Assessment
CO-6	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.	Assessment
CO-7	Familiarize with the security in databases and gaining familiarity with other popular databases used in the industry	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	5
2	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS -	15

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	MYSQL, ORACLE, DB2, SQL server. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. **Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	
3	**Storage strategies:** Indices, B-trees, hashing.	6
4	**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	9
5	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	5
6	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	3
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
2. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill Ellis

Suggested Reference Book(s):

1. "Database Systems: A Practical Approach to design, Implementation and Management". Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. Bipin C Desai, ?An Introduction to Database Systems?, Galgotia. Publications Pvt Limited, 2001
3. "An Introduction to Database Systems", C.J.Date, Pearson Education.
4. "A first course in Database Systems", Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
5. "Data Management: databases and organization", Richard T. Watson, Wiley.
6. " Data Modeling Essentials", Graeme C. Simxion, Dreamtech.

Other useful resource(s):

1. Link to NPTEL course contents:
   https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL9426FE14B809CC41
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/dbms/database_normalization.htm
   b. https://www.igi-global.com/journal/journal-database-management/1072
   c. https://www.tutorialspoint.com/dbms/dbms_hashing.htm

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Database Management Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-2	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-3	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-4	3	2	3	1	2	2	2	2	1	2	1	2	1.9
CO-5	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-6	3	2	3	1	1	3	2	1	1	3	2	1	1.9
CO-7	3	3	2	1	1	3	3	1	3	3	3	1	2.3
Average	3	2.6	2.4	1.1	1.6	2.6	2.6	1.7	1.9	2.6	2	1.4	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Deep Learning

COURSE CODE:

18B1WCI835 COURSE

CREDIT: 3

CORE/ELECTIVE:

ELECTIVE L-T-P: 3-0-0

Pre-requisites: None

Course Objectives:

1. Understand the major technology trends driving Deep Learning
2. Be able to build, train and apply fully connected deep neural networks
3. Know how to implement efficient (vectorized) neural networks
4. Understand the key parameters in a neural network's architecture

Course Outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Variability models (deformation model, stochastic model).	Usage
CO-2	Properties of CNN representations: invertibility, stability, invariance	Usage
CO-3	Covariance/invariance: capsules and related models.	Usage
CO-4	Other tasks: localization, regression.	Usage
CO-5	Dynamical systems: RNNs.	Assessment
CO-6	Autoencoders (standard, denoising, contractive, etc etc)	Assessment
CO-7	Maximum Entropy Distributions	Usage
CO-8	Non-convex optimization for deep networks	Assessment
CO-9	Stochastic Optimization	Assessment

Course Contents:

Unit	Contents	Lectures required
1	What is a neural network?, Supervised Learning with Neural Networks	4
2	Why is Deep Learning taking off?, A Review of Machine Learning	4
3	Foundations of Neural Networks and Deep Learning, Binary Classification	4
4	**Logistic Regression Cost Function,** Gradient Descent, Computation graph	6
5	Logistic Regression Gradient Descent, Computing a Neural Network's Output	6
6	Explanation for vectorized Implementation, Gradient descent for Neural Networks	6
7	Random Initialization, Forward and Backward Propagation	6
Total lectures		**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

1. François Chollet, "Deep Learning with Python", Manning Publications Company, 2018
2. Detailed course notes and slides written by the lecturer will be served as the examinable materials for the course. All required course materials are available from the institute's WebCT Web site.

Suggested Reference Book(s):

1. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media

Other useful resource(s):

1. https://www.coursera.org/learn/neural-networks-deep-learning/home/welcome
2. http://www.deeplearningbook.org/lecture_slides.html
3. https://www.cs.tau.ac.il/~dcor/Graphics/pdf.slides/YY-Deep%20Learning.pdf
4. http://cs229.stanford.edu/materials/CS229-DeepLearning.pdf
5. https://www.cse.iitk.ac.in/users/sigml/lec/DeepLearningLib.pdf
6. http://deeplearning.net/tutorial/deeplearning.pdf

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Graph Theory)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8
CO-2	3	3	3	2	1	1	2	3	2	3	3	3	2.4
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	2.3
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	2.5
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	2.4
CO-6	3	3	3	3	2	1	2	3	2	2	3	3	2.5
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	2.6
CO-8	3	3	3	3	2	2	3	3	2	1	3	2	2.5
CO-9	3	3	3	3	2	3	3	3	2	2	3	2	2.7
Average	3	3	2.8	2.6	1.9	1.7	2.4	2.8	2	2.3	3	2.8	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:
   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	**2.4**
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	**2.3**
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	**2.5**
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	**2.4**
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	**2.7**
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	**2.6**
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	**2.5**
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:
   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	**2.4**
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	**2.3**
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	**2.5**
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	**2.4**
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	**2.7**
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	**2.6**
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	**2.5**
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • H.P.
IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Python Programming with Raspberry PI

COURSE CODE: 18B11CI315

COURSE CREDITS: 3

: 3-0-0

Pre-requisite: None

Course Objectives:

Raspberry Pi chose Python as its teaching language of choice to encourage a new generation of programmers to learn how to program. This approachable book serves as an ideal resource for anyone wanting to use Raspberry Pi to learn to program and helps you get started with the Python programming language. Aimed at first-time developers with no prior programming language assumed, this beginner book gets you up and running.

1. Covers variables, loops, and functions
2. Addresses 3D graphics programming
3. Walks you through programming Mine craft
4. Zeroes in on Python for scripting.

Course Outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Introducing Raspberry pi: what is programming, why raspberry pi, introducing the raspberry pi	Familiarity
CO-2	Introducing Python: Scripting vs. a Programming Language, The Python Philosophy, Getting Started with Python, Python basics, Programming with Python	Assessment
CO-3	Graphical Programming: Graphical User Interface (GUI) Programming, Adding Controls, Creating a Web Browser, Adding Window Menus, the web bolt, Calculating the Distance of the Point from the Light Source.	Assessment
CO-4	Creating games: building a game, installing Pi game, creating a worlds, detecting collisions, adding sound, adding scenery, adding the finishing touches, realistic game physics, Calculating Reflecting Angles, Building the 3D Model, Speaking to Your Pi.	Usage
CO-5	Networked Python: Understanding Hosts, Ports, and Sockets, Locating Computers with IP Addresses, Building a Chat Server, Tweeting to the World.	Familiarity
CO-6	Multimedia: Using Pi Audio to Get Sound into Your Computer, Recording the Sound, Speaking to Your Pi, Making Movies, Adding Computer Vision Features with Open CV, Creating Live Streams.	Usage

Course Contents:

Unit	Contents	Lecture required
1	Introduction: what is programming, why raspberry pi, introducing the raspberry pi	3
2	Introducing Python: Scripting vs. a Programming Language, The Python Philosophy, Getting Started with Python, Python basics, Programming with Python	9

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	Graphical Programming: Graphical User Interface (GUI) Programming, Adding Controls, Creating a Web Browser, Adding Window Menus, the web bolt, Calculating the Distance of the Point from the Light Source.	9
4	Creating games: building a game, installing Pi game, creating a worlds, detecting collisions, adding sound, adding scenery, adding the finishing touches, realistic game physics, Calculating Reflecting Angles, Building the 3D Model, Speaking to Your Pi.	1
5	Networked Python: Understanding Hosts, Ports, and Sockets, Locating Computers with IP Addresses, Building a Chat Server, Tweeting to the World.	6
6	Multimedia: Using Pi Audio to Get Sound into Your Computer, Recording the Sound, Speaking to Your Pi, Making Movies, Adding Computer Vision Features with Open CV, Creating Live Streams.	4
7	Scripting: Getting Started with the Linux Command Line, Using the Sub process Module, Command-Line Flags, and Scripting with Networking.	3
8	Interfacing with hardware and testing and debugging: Setting Up Your Hardware Options, Sneed of hardware, Finding Bugs by Testing, Checking Bits of Code with Unit Tests, Using Test Suites for Regression Testing, Making Sure Your Software's Usable.	2
Total Lectures		**42**

Suggested Text Book(s):

1. **Learning Python with Raspberry Pi** By Alex Bradbury, Ben Everard
2. **Learn Raspberry Pi Programming with Python** By Wolfram Donat

Suggested Reference Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle& Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc18_cs35/preview
2. https://nptel.ac.in/courses/106106145/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to- computer-science-and-programming-in-python-fall-2016/index.htm
4. https://docs.python.org/3/tutorial/index.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

*In Test-I Paper the 20% of 15 Marks will be allocated to Introduction to Computers portion and 80% of 15 Marks will be allocated toIntroduction to Programming portion.

#In Test-II Paper the 20% of 25 Marks will be allocated tosyllabus of Test-I and 80% of 25 Marks will be allocated tofurther covered portion.

$In Test-III Paper the 40% of 30 Marks will be allocated to syllabus of Test-I+ Test-II and 60% of 30 Marks will be allocated to further covered portion.

~Internal Assessment will purely be focused on the assignments and quizzes based on Python Programming.

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Python Programing with Raspberry PI)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	3	3	2	1	1	1	3	**2.1**
CO-2	3	3	3	1	2	3	3	3	2	1	1	3	**2.3**
CO-3	3	3	3	1	2	3	2	3	2	1	1	3	**2.3**
CO-4	3	3	3	3	3	3	3	2	2	1	1	3	**2.5**
CO-5	3	3	3	2	2	3	3	3	2	1	1	3	**2.4**
CO-6	3	3	3	2	3	2	3	2	2	1	1	3	**2.3**
Average	**3**	**2.8**	**3**	**1.7**	**2.3**	**2.8**	**2.8**	**2.5**	**1.8**	**1**	**1**	**3**	

Python Programing with Raspberry PI (Lab)

COURSE CODE: 18B11CI311

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Python Programming Essentials

COURSE CODE: 18B11CI314

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Provide an understanding of the role computation can play in solving problems.
2. Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
3. Position students so that they can compete for research projects and excel in subjects with programming components.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Familiarity about concepts of Python Programming. Broaden the knowledge about Variables, expressions and Functions in Python.	Familiarity
CO-2	Broaden the knowledge about Branching and Iteration. To have hands on skills on String Manipulation, Guess and Check, Approximations, Bisection	Assessment
CO-3	To learn about Decomposition Abstractions, Tuples, Lists, Dictionaries and Illustrative programs:	Assessment
CO-4	Files, Modules, Packages and Testing, Debugging, Exceptions, Assertions:	Usage
CO-5	Understanding and analyzing Object Oriented Programming:	Familiarity
CO-6	To have hands on skills on Illustrative programs(examples Sorting and Searching, Regular expressions) and GUI	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Informal introduction to Python programming language:** What is a program?, What is debugging?, Formal and natural languages, Downloading and installing Python., The first program, Debugging **Variables, expressions and Functions in Python** Values and types, Variables, Variable names and keywords, Operators and operands, Expressions and statements, Interactive mode and script mode, Order of operations, String operations, Function calls, Type conversion functions, Math functions, Composition, Adding new functions, Definitions and uses, Flow of execution **Parameters and arguments**	5
2	**Branching and Iteration:** Loops, Multiple assignment, Updating variables, The while statement, Break **String Manipulation, Guess and Check, Approximations, Bisection:** String manipulation, Guess and check algorithms(e.g: find Square Root etc), Approximate solutions(e.g	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Successive approximation), Bisection method.	
3	**Decomposition, Abstractions:** divide and conquer (modules), Abstraction **Tuples, Lists, Dictionaries, Illustrative programs:** - Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; - Tuples: tuple assignment, tuple as return value; - Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram	7
4	**Files, Modules, Packages**: Files and exception: text files, reading and writing files, format operator, Packages, Illustrative programs: word count, copy file. **Testing, Debugging, Exceptions, Assertions:** Unit testing framework(unit test), debugger for Python program(pdb), Handling an exception	7
5	**Object Oriented Programming:** -Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects -OOP, continued: inheritance, polymorphism, operator overloading, abstract classes.	7
6	**Illustrative programs(examples):** • Sorting and Searching • Regular expressions o Match function o Search function o Matching vs. Searching o Modifiers o Patterns **GUI :** Introduction, Tkinter programming, Tkinter widgets	8
Total lectures		**42**

Suggested Text Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705

Suggested Reference Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc18_cs35/preview
2. https://nptel.ac.in/courses/106106145/

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm
4. https://docs.python.org/3/tutorial/index.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	*T-1	15	1 Hour.	Syllabus covered up to T-1
2	#T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	ST-3	35	2 Hours	Entire Syllabus
4.	~Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

*In Test-I Paper the 20% of 15 Marks will be allocated to Introduction to Computers portion and 80% of 15 Marks will be allocated to Introduction to Programming portion.

#In Test-II Paper the 20% of 25 Marks will be allocated to syllabus of Test-I and 80% of 25 Marks will be allocated to further covered portion.

$In Test-III Paper the 40% of 30 Marks will be allocated to syllabus of Test-I+ Test-II and 60% of 30 Marks will be allocated to further covered portion.

~Internal Assessment will purely be focused on the assignments and quizzes based on Python Programming.

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Python Programming Essentials)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	3	3	2	1	1	1	3	2.1
CO-2	3	3	3	1	2	3	3	3	2	1	1	3	2.3
CO-3	3	3	3	1	2	3	2	3	2	1	1	3	2.3
CO-4	3	3	3	3	3	3	3	2	2	1	1	3	2.5
CO-5	3	3	3	2	2	3	3	3	2	1	1	3	2.4
CO-6	3	3	3	2	3	2	3	2	2	1	1	3	2.3
Average	3	2.8	3	1.7	2.3	2.8	2.8	2.5	1.8	1	1	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Deep Learning

COURSE CODE:

18B1WCI835 COURSE

CREDIT: 3

CORE/ELECTIVE:

ELECTIVE L-T-P: 3-0-0

Pre-requisites: None

Course Objectives:

1. Understand the major technology trends driving Deep Learning
2. Be able to build, train and apply fully connected deep neural networks
3. Know how to implement efficient (vectorized) neural networks
4. Understand the key parameters in a neural network's architecture

Course Outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Variability models (deformation model, stochastic model).	Usage
CO-2	Properties of CNN representations: invertibility, stability, invariance	Usage
CO-3	Covariance/invariance: capsules and related models.	Usage
CO-4	Other tasks: localization, regression.	Usage
CO-5	Dynamical systems: RNNs.	Assessment
CO-6	Autoencoders (standard, denoising, contractive, etc etc)	Assessment
CO-7	Maximum Entropy Distributions	Usage
CO-8	Non-convex optimization for deep networks	Assessment
CO-9	Stochastic Optimization	Assessment

Course Contents:

Unit	Contents	Lectures required
1	What is a neural network?, Supervised Learning with Neural Networks	4
2	Why is Deep Learning taking off?, A Review of Machine Learning	4
3	Foundations of Neural Networks and Deep Learning, Binary Classification	4
4	**Logistic Regression Cost Function,** Gradient Descent, Computation graph	6
5	Logistic Regression Gradient Descent, Computing a Neural Network's Output	6
6	Explanation for vectorized Implementation, Gradient descent for Neural Networks	6
7	Random Initialization, Forward and Backward Propagation	6
Total lectures		**42**

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

1. François Chollet, "Deep Learning with Python", Manning Publications Company, 2018
2. Detailed course notes and slides written by the lecturer will be served as the examinable materials for the course. All required course materials are available from the institute's WebCT Web site.

Suggested Reference Book(s):

1. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media

Other useful resource(s):

1. https://www.coursera.org/learn/neural-networks-deep-learning/home/welcome
2. http://www.deeplearningbook.org/lecture_slides.html
3. https://www.cs.tau.ac.il/~dcor/Graphics/pdf.slides/YY-Deep%20Learning.pdf
4. http://cs229.stanford.edu/materials/CS229-DeepLearning.pdf
5. https://www.cse.iitk.ac.in/users/sigml/lec/DeepLearningLib.pdf
6. http://deeplearning.net/tutorial/deeplearning.pdf

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Graph Theory)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8
CO-2	3	3	3	2	1	1	2	3	2	3	3	3	2.4
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	2.3
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	2.5
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	2.4
CO-6	3	3	3	3	2	1	2	3	2	2	3	3	2.5
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	2.6
CO-8	3	3	3	3	2	2	3	3	2	1	3	2	2.5
CO-9	3	3	3	3	2	3	3	3	2	2	3	2	2.7
Average	3	3	2.8	2.6	1.9	1.7	2.4	2.8	2	2.3	3	2.8	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Scripting Language for Bioinformatics

COURSE CODE: 18B11BI512

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Basic programming principal

Course Objectives:

1. To apply, and develop scripting languages codes and implement them towards the analysis of biological data. Additionally to Develop web based applications for the problems in biology. All students will be able to develop their own websites.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to apply design principles to develop web based applications specially for biological data analysis	Familiarity
CO-2	To understand working on world wide web through implementations	Familiarity and Assessment
CO-3	Use various methods from computational biology to implement their programmatic versions	Assessment
CO-4	Able to design new web pages and web sites	Assessment and Usage
CO-5	Able to developed programs to describe and analyze problems in biology	Assessment and Usage

Course Contents:

Unit	Contents	Lecture Hours
1	Introduction to Internet and World Wide Web. An overview of scripting languages, with applications towards biological data and sequence analysis. Complexity of DNA problems and their computational implications and applications. Introduction to HTML, DHTML, XML. accessing different objects of the HTML page, Dynamic page generation, Cascading Style Sheets (CSS).	12
2	JAVASCRIPT: Document object model, Elements of the document object model, basic principles of JS, object based programming using JavaScript; data types and structures, array and string handling, function implementations, XML: DTD, XML schemas, XML document structure, retrieving data from database in XML format; various bio based versions of XML.	10
3	PHP: PHP beginning to advanced level, data types, array and string handling, mathematical expressions and functions in PHP, PHP programming (implementation of object model), Database connectivity using PHP.	12

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

4	Hands-on practice on above mentioned programming languages. Implementation of programming skills for solving problems in biology. Development of bioinformatics based small applications and web based applications.	8
Total Lectures		42

Suggested Text Book(s):

1. HTML the complete reference, 2004, TMH.
2. Beginning PHP and Professional PHP, 2009, Wrox, Wiley Dreamtech.
3. JavaScript: The complete Reference, 2004, TMH.

Suggested Reference Book(s):

1. Biological Sequence Analysis: Probabistic models of proteins and nucleic acids (1998) Durbin R., et al, Cambridge University press.
2. Many other reference and text books on these scripting languages available in the library.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Scripting Languages for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	3	2	2	2	1	3	2	3	2	2.08
CO-2	3	2	2	2	-	-	-	1	-	1	2	2	1.88
CO-3	3	3	3	3	2	2	1	1	2	1	-	2	2.09
CO-4	3	3	3	1	-	-	-	-	2	2	2	1	2.13
CO-5	3	2	2	2	2	2	-	-	-	2	-	1	2.00
Average	2.8	2.4	2.2	2.3	2	2	1.5	1	2.33	1.6	2.33	1.6	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Design and Analysis of Algorithms

COURSE CODE: 18B11CI412

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Data structure and algorithms

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.	Technical
CO-2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.	Technical
CO-3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.	Technical
CO-4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.	Technical
CO-5	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.	Technical
CO-6	Explain the ways to analyze randomized algorithms (expected running time, probability of error).	Technical
CO-7	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).	Technical

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters" theorem. Examples: Binary counter, Recursive Fibonacci in LogN	10
2	Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	of Algorithms; Illustrations of these techniques for Problem- Solving , Bin Packing, Knap Sack TSP. Heuristics characteristics and their application domains. Examples: Greedy and dynamic scheduling, Hoffman encoding, Dynamic programming: Longest common subsequence, Matrix chain multiplication, Dynamic programming: Bin packing, Knapsack, Dynamic programming: TSP, Branch and Bound TSP, Backtracking: SAT, Maze Sudoku solver, 8 queen	
3	Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Examples: Best first search, Binomial heap MST: Prims, Kruskal, Fibonacci heap MST: Tarjan, Lazy decrease key implementation and Dijkstra, MaxFlow/ MinCut Ford-Fulkersion	8
4	Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook"s theorem, Standard NP-complete problems and Reduction techniques. Examples: Set Cover, Vertex cover, Map coloring, chromatic number	8
5	Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems, beyond NP – P SPACE, Examples: Approximate matrix inversion, Randomized Eigen vector computation	8
Total lectures		**42**

Suggested Text Book(s):

1. Rntroduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.

Suggested Reference Book(s):

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition,
3. Michael T Goodrich and Roberto Tamassia, Wiley.
4. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs20/preview
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106101060/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Digital Electronics & Logic Design Lab

COURSE CODE: 18B17EC372

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

: 0-0-2

Pre-requisite: None

Course Objectives:

1. To provide students basic experimental experiences in constructing digital circuits.
2. Design simple digital systems based on digital abstractions.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO1	To acquire knowledge about electronic components and hardware devices required for designing digital electronics circuits.	Familiarity
CO2	Foster ability to identify, analyze and design combinational circuits.	Familiarity
CO3	Foster ability to design various synchronous and asynchronous sequential circuits.	Usage
CO4	To acquire knowledge about internal circuitry and logic behind any digital system.	Usage
CO5	To develop skill to build, and troubleshoot digital circuits.	Assessment

List of Experiments

S. No	Description	Hours
1	To implement Logic gates using TTL ICs (7400, 7402, 7404, 7408, 7410, 7411, 7420, 7427, 7432, and 7486).	2
2	Implementation of Combinational Circuits.	2
3	To verify NAND and NOR gates are universal gates.	2
4	Implementation of Combinational Logic Design using 74** ICs.	2
5	Simplification of Boolean expression using Karnaugh Map Method.	2
6	To design a 4 bit Binary to Gray code Converter, bit Gray to Binary code Converter, 3 bit Binary to Excess-3 code Converter.	2
7	To implement Adder and Subtractor circuits:- (Half and Full using simple gates and universal gates).	2
8	Implement multiplexer using gates and TTL IC's.	2
9	To verify the truth table of Binary (2 bit) to decimal decoder and octal to decimal decoder.	2
10	To verify the truth table of one bit and two bit Comparators using logic Gates.	2
11	To verify the truth tables for each (a) DDL OR gate (b) DDL AND gate (c) TTL OR gate (d) TTL AND gate (e) TTL NAND gate (f) TTL NOR gate.	2
12	Functional table verification of Latches: • SR-Latch with NOR Gates • SR-Latch with NAND Gates • SR-Latch with control input using NAND Gates • D Latch • T Latch	2
Total Lab hours		24

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested/Resources:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India.
2. M. M. Mano, "Digital Logic and Computer Design", Pearson Education India.
3. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education.
4. https://onlinecourses.nptel.ac.in/noc18_ee33/ (Prof. Santanu Chattopadhyay, IIT Kharagpur)
5. https://nptel.ac.in/courses/117106086/ (Prof. S. Srinivasan, IIT Madras)

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Biological Computation

COURSE CODE:18B11BI313

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: Introduction to Bioinformatics

Course Objectives:

1. To use & develop tools to curate (compare &analyze) biological data.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Basic algorithms used in Pairwise and Multiple alignments.	Usage
CO-2	Understanding the methodologies used for database searching, and determining the accuracies of database search.	Usage
CO-3	Application of probabilistic model to determine important patterns.	Familiarity
CO-4	Prediction of structure from sequence and subsequently testing the accuracy of predicted structures.	Usage
CO-5	Determine the protein function from sequence through analyzing data.	Usage
CO-6	Analysis and development of models for better interpretation of biological data to extract knowledge.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction** Meaning of sequence, sequence similarity, homology, meaning of alignment.	1
2	**Pairwise Sequence Alignment**Different scoring models, Substitution matrices (PAM and BLOSUM), Pairwise Alignment: Concept of Global and Local Alignment, Dot matrix method, Dynamic programming (Needleman-Wunsch algorithm, Smith-Waterman algorithm, Choosing of best scoring matrix, gap penalties, Significance of score, EVD, FASTA and BLAST algorithms, Information theory and Shanon Entropy.	13
3	**Multiple Sequence alignment**Multiple Sequence Alignment methods (MSA), Scoring of a MSA, Progressive (CLUSTALW and PILEUP), Iterative (Genetic) and Hidden Markov Model (HMM) methods of MSA, Local MSA (Profile and BLOCK analysis, and Pattern searching, and Expectation Maximization (EM) Algorithm (MEME) and Gibbs Sampler.	6
4	**Structural Alignment Tools and Protein Tertiary Structure Prediction** Structure alignment algorithms & Homology modeling.	3

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Markov Chains and HMM** Frequent words in DNA, Consensus word analysis, Transaction and emission matrix, Development of training set, CpG island prediction using HMM, Application of HMM in gene finding, and Multiple sequence alignment by HMM method.	7
6	**Phylogenetic Analysis** Phylogenetic tree and terminology, different methods of Phylogenetic tree prediction: maximum parsimony, distance (UPGMA, NJ), maximum likelihood methods, bootstrapping, Jacknifing and Phylogenetic analysis by using Bayesian Network.	7
7	**RNA Structure Analysis** Terminology of RNA secondary structure, inferring structure by comparative sequence analysis, RNA secondary structure prediction, Nussinov folding algorithm, energy minimization and Zuker folding algorithm.	5
Total lectures		**42**

Suggested Text Book(s):

1. D.W. Mount *Bioinformatics: Genome and Sequence Analysis*: (2001) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
2. Ian Korf, Mark &Josaph: *BLAST*, Oreilly Publisher, 2003
3. R. Durbin, S. Eddy, A. Krogh and G. Mitchison, *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids.* Cambridge University Press.
4. A.D. Baxevanis& B.F.F. Oulette*Bioinformatics – A practical guide to the Analysis of Genes and Proteins*,2002, Willey International publishers.
5. M.J. Bishop and C.J. Rawlings (editors), *DNA and Protein Sequence Analysis---A Practical Approach* IRL Press at Oxford University Press, ISBN 0 19 963464 7 (Pbk)
6. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York

Suggested Reference Book(s):

6. J. Setubal and J. Meidanis(1997) *Introduction to Computational Molecular Biology,* PWS Publishing Co.
7. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc19_bt01/preview

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Biological Computation)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-2	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-3	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-4	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-5	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-6	3	3	3	3	3	1	1	-	1	1	1	3	1.9
Average	3	3	3	3	3	1	1	-	1	1	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

XXXXXXXX: Bioinformatics Data Management

Course Credit: 4 (3-1-0)
Semester: III

Introduction

Bioinformatics is a highly interdisciplinary domain and is an excellent source of diversified data. This diversified data needs attention in the collection, analysis and management. Database Management Systems (DBMS) consists of a set of interrelated data and a set of programs to access that data. They underpin any computer system and are therefore fundamental to any programme of study in information science and engineering. An understanding of DBMS is crucial in order to appreciate the limitations of data storage and application behavior and to identify why performance problems arise. With the advent of new technologies in Biological sciences, enormous amount of data is being generated in last two decades. DBMS can support the management of this data through Bioinformatics domain.

Students who complete this course are expected to develop the ability to design, implement and manipulate databases for various biological and medical science domains. Students will apply and build databases for various day to day real life scenarios and real life applications for several diseases and biomedical applications. The course will by and large be structured but will introduce open-ended data base problems for biological data.

Course Objectives (Post-conditions)

Knowledge objectives:

- Understand diversity of biological and biomedical data.
- Ability to build normalized databases.
- Knowledge of Entity Relationship Modeling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues in biological systems.
- Familiarity with ODBC, JDBC.

Application objectives:

- Develop the ability to design, implement and manipulate databases.
- Introduce students to build database management systems.
- Apply DBMS concepts to various biological and biomedical applications.

Expected Student Background (Preconditions)

- Introduction to any programming language (Preferably, C/C++)
- Data Structures

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

Topics Outline:

S NO	Topics	Hrs
1	To understand complexity of biological data and Introduction to Database Management Systems	2
2	Introduction to Conceptual Modeling	3
3	Relational Model	2
4	Relational Languages like SQL (including JDBC for database connectivity, ODBC, JDBC and SQLJ)	5
5	Integrity and Security	2
6	Database Design with special relevance to biological data dimensions	5
7	Object oriented and Object Relational Database	4
8	File Storage Methods	2
9	Query Optimization	2
10	Transaction Management	6
11	Database System Architecture	2
12	Development of template databases of biological and biomedical domains	4
13	Case Studies of various Bioinformatics databases	3
	Total	42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

References

1. Silberschatz, Korth and Sudarshan, "Database System Concepts", 6th Edition,McGraw Hill, 2010
2. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson, Addison-Wesley, 2010
3. C.J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003
4. Ramakrishnan & Gherke, Database Management Systems, 2nd Edn., McGraw
5. Connolly and Begg, "Database Systems", 4th Edn., Addison-Wesley, 2005
6. Toby, Lightstone and Jagadish, "Database Modeling and Design", 5th Edn, Elsevier, 2011
7. Coronel and Rob, "Database Systems", 9th Edn., Cengage, 2011
8. IEEE / ACM Transactions on Database Systems (TODS)
9. DBMS related Journals

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	8 marks (4x2)
Quizzes	12 marks (4x3)
Regularity/Attendance	5 Marks

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Structure and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisites: C/C++

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures
5. Introduce students to data abstraction and fundamental data structures.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	7
2	**Stacks:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	5
3	**Queues:** ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	5
4	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	8
5	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	6
6	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	6
7	**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	5
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.
3. "Data structures and Algorithms Made Easy" 5th edition by Narasimha Karumanchi, Career monk publications
4. "Data Structure and Algorithms in C" 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106102064/
2. Link to topics related to course:
   a. https://onlinecourses.nptel.ac.in/noc18_cs25/preview

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

b. https://nptel.ac.in/courses/106103069/

c. http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Advanced Algorithms for Bioinformatics

COURSE CODE: 18B1WBI631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basics of data structures, algorithms, and basic methods in computational biology

Course Objectives:

1. The overall objective of the course is to develop an understanding of algorithms implementation for solving problems in biology.
2. To evaluate existing algorithms, possible improvements and for their implementations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to apply algorithmic principles to address problems in biology	Analytical
CO-2	Use various methods from computational biology to implement their algorithmic versions	Usage
CO-3	Analyze problems in biology and able to design new protocols and algorithms for biological data analysis	Analytical
CO-4	Able to analyze the algorithms in computational biology and identify their limiting factors to propose new design principles	Analytical
CO-5	Assessment of biological complexity through algorithmic principles	Analytical

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:**An overview of Algorithms, Sequence and String search algorithms with mathematical formulations for similarity and distance scoring systems with their algorithmic implementations.	6
2	**Genome Assembly:**Complexity of DNA problems and their simulatory solutions. Genome assembly algorithms, their computational	7
	implications and applications.	
3	**Graph based Algorithms:**Graph algorithms in bioinformatics and their applications to fragment assembly, Eulerian and Hamiltonian Cycle Problem, Interval graph algorithm, shortest superstring problem and its mapping with traveling salesman problem.	4
4	**Motif and Regulatory element's Algorithms:**Algorithms for finding regulatory motifs in genomic sequences through profiles and consensus approaches. Brute Force Motif Search, Median String Search algorithms and their refinements. Algorithms for Sequencing by hybridization (SBH), use of spectrum approach to solve SBH problem.	5
5	**Gene prediction:**Algorithmic approaches for Contig assembly to super- contigs. Computational challenges for gene prediction, popular algorithms and their implementations for gene prediction. Exon chaining and Spliced Alignment Problems.	7
6	**Brute Force and branch and bound algorithms:**Brute Force and branch and bound algorithms for Partial Digest Problem, restriction mapping, partial digest	

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

	and double digest problems and their solutions through multiset and homometric sets.	5
7	**MSA advancedments:**Progresssive and iterative refinements of MSA algorithms, Barton-Sternberg Iterative Refinement Algorithm, STAR and TREE alignment approaches, Greedy and Entropy approach for MSA.	5
8	**Graph based MSA advancements:**Partial Order (PO)-MSA, and A- Bruijn Alignment (ABA) algorithm for MSA. Combinatorial dynamic programming approach for MSA.	3
Total Lectures		42

Suggested Text Book(s):

1. Computational Molecular Biology: An algorithmic approach (2004), P.A. Pevzner, PHI.
2. An Introduction to Bioinformatics Algorithms (2004) N.C. Jones and P.A. PevznerAne Books.
3. Algorithms in Bioinformatics (2004), G. Benson and R. Page (Eds): Springer Verlag.

Suggested Reference Book(s):

1. Bioinformatics Algorithms: Techniques and Applications, I.I. Mandoiu and A Zelikovsky,

   Wiley Interscience Press.

2. Biological Sequence Analysis: Probabistic models of proteins and nucleic acids (1998) Durbin R., et al, Cambridge University press.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Advanced Algorithms for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	1	3	2	2	2	1	3	2	3	3	2.25
CO-2	3	2	2	1	-	1	-	-	-	1	2	3	1.88
CO-3	3	3	3	3	2	2	2	1	2	-	-	2	2.30
CO-4	3	3	3	1	-	-	-	-	2	1	2		2.14
CO-5	3	1	2	2	2	2	-	1	-	2	-	1	1.78
Average	2.8	2.4	2.2	2	2	1.75	2	1	2.33	1.5	2.33	2.25	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Datawarehousing and Mining for Bioinformatics

COURSE

CODE:18B

1WBI632

COURSE

CREDITS:

3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Biochemistry

Course Objectives:

1. Learn to develop and use datawarehouse
2. Learn feature selection methods
3. Learn methods for data mining.
4. Apply data mining techniques in biological datasets.
5. Learn and apply cross-validation.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will have a thorough understanding of various datawarehousing components and architecture.	Familiarity
CO-2	Students will understand various types of data models.	Assessment
CO-3	Students will understand how to perform feature selection and derive association rules	Assessment
CO-4	Students will understand how to perform various types of data mining, including clustering, neural networks etc.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Knowledge Discovery Process -** Understanding the business intelligence cycle	2
2	**Introduction to Data warehousing –** Components of data warehouse, Architecture, lifecycle & related core terms.	2
3	**Types of Data warehouse design methodologies –** Top Down Approach, Bottom Down approach, Hybrid design Approach	3
4	**Data Models -** Dimensional Data Modeling (Star Schema, Snowflake Schema); Relational Data Modeling; Conceptual, Physical & Logical Data Model.	3
5	**Multidimensional Analysis –** OLAP & OLTP Approaches	2
6	**Building & Maintaining the data warehouse –** ETL design & development;	2
7	**Introduction to Data Mining -** concepts and techniques for the	2
	discovery of patterns hidden in large data sets	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

8	**Grouping of data -** Classification and Clustering Methods; Decision Tree, Neural Network, Nearest Neighbor, Genetic Algorithm	7
9	**Feature Selection Methods -** Wrapper & Filter Approach, Correlation analysis,PCA	7
10	**Association Rule Learning Based Methods -** Apriori Algorithm	7
11	**Statistical techniques involved in data mining** – regression based model development	1
12	**Cross Validation Techniques -** Jackkniffing, Bootstrapping, Sensitivity, Specifcity, Accuracy	2
	Total Number of Lectures	42

Suggested Text Book(s):

a. Kimball, R., Margy, R. : The Data Warehouse Toolkit, 2nd Edition: The Complete Guide to Dimensional Modeling, John Wiley &SonsMolecular Biology of the Gene (1987) Watson J. D., Hopking N., Robast J. and Steiz, J.

b. Inmon, B. :Building the Data Warehouse, John Wiley & Sons.

Suggested Reference Books(s):

1. Pei, Han and Kamber, Data mining: Concepts and techniques third edition, Elsevier, 2011
2. Data Mining: Practical Machine Learning Tools and TechniquesKim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE,
3. Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2016

Other useful resource(s):

a. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_cs14/preview

b. Link to topics related tocourse:

iv. https://nptel.ac.in/courses/102104063

v. https://nptel.ac.in/courses/102106069/

vi. https://nptel.ac.in/courses/102106026/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course outcomes (Datawarehousing and Mining for BI)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	1.9
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	1.75
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	1.7
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	1.7
Average	2.0	2.0	2	2	2	1.25	1.25	1.5	2.0	2	1.33	2.0	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Compiler Design

COURSE CODE: 18B11CI612

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisites: Perquisite for this course is programming languages like C, C++, java and basic knowledge of formal language and automata theory. This is a programming-intensive course. The primary languages used are C and Java and familiarity with them is assumed.

Course Objectives:

1. To understand the basic concept of compilation particular, lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation.
2. Ability to create lexical rules and grammars for a programming language.
3. Ability to use flex or similar tools to create a lexical analyzer and Yacc/Biscon tools to create a parser
4. Ability to implement a various parser such as a bottom-up SLR parser without using any compiler-generation tools
5. Ability to implement a various intermediate code generation techniques without using any compiler generation tools
6. Ability to implement various code optimizing techniques without using any compiler-generation tools
7. Ability to implement semantic rules into a parser that performs attribution while parsing
8. Ability to design a compiler for a concise programming language.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the basic concept of compilation particular, lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation	Familiarity
CO-2	Ability to create lexical rules and grammars for a programming language	Familiarity
CO-3	Ability to use flex or similar tools to create a lexical analyzer and Yacc/Biscon tools to create a parser	Computational skills
CO-4	Ability to implement a various parser such as a bottom-up SLR parser without using any compiler-generation tools	Technical skills
CO-5	Ability to implement a various intermediate code generation techniques without using any compiler generation tools	Technical skills
CO-6	Ability to implement various code optimizing techniques without using any compiler-generation tools	Technical skills
CO-7	Ability to implement semantic rules into a parser that performs attribution while parsing	Assessment
CO-8	Ability to design a compiler for a concise programming language	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Compilers, Analysis of Source Program, Phases of Compiler, Issues in a Compiler Structure, Major Data Structures in Compiler, Bootstrapping and Porting	3
	Lexical Analysis: Role of the Lexical Analyzer, Scanning Process- Input Buffering, Specification of Tokens, Recognition of Tokens, Regular Language,	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

2	Finite Automata, Regular Expression, Regular Expression to Finite automata, Scanner Generator (lex, flex)	4
3	**Syntax Analysis:** Parsing Process, Context-Free Grammar, Handle, Ambiguity, Parse Tree, Push-Down Automata , Top Down Parsing: Basic Concept, Recursive Descent Parsing, First Function, Follow Function, Conflicts-Shift Reduce, Reduce-Reduce, LL(1) Grammar, LL(1) Parser, Error Recovery, Bottom up parsing :Basic Concept, Shift Reduce Parsing, Operator Grammar, Operator Precedence Parsing, Augmented Grammar, LR(0) Item Set, LR(0) Parsing, LR(1) Item Set, SLR(1) Parsing, Canonical LR Parser, LALR parsing, Error Recovery, YACC and BISON	12
4	**Semantic Analysis:** Syntax-Direct Definitions, Implementation of Syntax-directed Translators, Bottom-up Evaluation of S-attributed Definitions, L-attributed Definitions, and Top-down Translation	5
5	**Intermediate Code Generation:** Postfix Notation, Parse Trees & Syntax Trees, Three Address Code, Quadruple & Triples, Translation of Assignment Statements, Boolean Expressions, Statements That Alter Flow of Control, Postfix Translation, Array References in Arithmetic Expressions, Procedures Call, Declarations and Case Statements	5
6	**Code Generation: Issues** in the design of a Code Generator, Target Machine, Run-Time Storage Management, Basic blocks and Flow graphs	4
7	**Code Optimization:** Machine-Independent Optimizations, Machine Dependent Optimization, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis	5
8	**Run-time environment and Symbol:** Procedure activation, parameter passing, value return, memory allocation, and scope, Symbol Table, Definition, Structure, Types, symbol attributes and management	4
Total Lectures		42

Suggested Text Book(s):

1. Compilers: Principles, Techniques, and Tools by Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, Pearson Publisher
2. Compiler Construction, Kenneth C. Louden, 582 pages
3. Modern Compiler Implementation in C, Andrew W. Appel, 544 pages

Suggested Reference Book(s):

1. http://ecomputernotes.com/compiler-design
2. http://www.diku.dk/~torbenm/Basics/basics_lulu2.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Compiler Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	3	3	2	1	3	2	1	**2.1**
CO-2	3	3	2	1	1	3	3	1	3	3	3	1	**2.3**
CO-3	3	3	2	1	2	2	2	1	2	3	3	2	**2.2**
CO-4	3	3	3	2	2	2	3	2	2	1	2	2	**2.3**
CO-5	3	3	3	2	2	2	2	2	1	3	2	1	**2.2**
CO-6	3	3	3	3	2	3	3	2	2	3	2	2	**2.6**
CO-7	3	3	3	3	2	3	3	1	2	3	2	2	**2.5**
CO-8	3	3	3	3	2	3	3	2	2	2	3	2	**2.6**
Average	**3**	**2.9**	**2.6**	**2**	**1.9**	**2.6**	**2.8**	**1.6**	**1.9**	**2.6**	**2.4**	**1.6**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Modeling and Simulation Techniques

COURSE CODE: 18B11CI413

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 2-0-0

Pre-requisite: Discrete Mathematics, Algorithm, Software Engineering

Course Objectives:

1. Student will model real-world systems and implement the model as a computer program
2. Student will learn model design and development comparison to analytical models.
3. Student will learn important methods of computing and statistics.
4. Student will learn important techniques of real world project development and management.
5. Student will learn to evaluate the performance of real-world systems by analyzing the output of the model under various conditions..

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of computer simulation and modeling.	Familiarity
CO-2	To learn statistical methods of estimation and testing and other relevant concepts	Technical
CO-3	To explain the working and applications of different types of simulation such as Monte Carlo, VS. Discrete Event	Technical
CO-1	You will learn how to model a system and the execution of simulation tools.	Technical
CO-2	You will learn to analyze input data, its parameters, and the use of random number in a typical simulation study.	Technical
CO-3	Student will learn different techniques for the Verification and Validation of a simulation study	Technical

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Simulation and Modeling:** Simulation: Definition, Methods, Systems, Variability, Complexity, Advantages. Modelling: Definition, characteristics, description, categories.	5
2	**Statistical Concepts:** Hypothesis, Estimation, Statistical Significance, Error/Risks. Statistical tests, Bounds and Correlation. Input Data Modelling, Output Data Analysis.	5
3	**Discrete-Event Simulation, Monte Carlo Simulation:** Queuing System Model Components, Simulation Methodology, DES Example, Implementation, Arena Simulation. The Monte Carlo Method, Sensitivity Analysis	8
4	**Systems Modeling:** System Model Types, Modeling Methodologies and Tools, Analysis of Modeling and Simulation, Operation Research Methods, Coding the Model, Use of Pseudo Random Number Streams.	8
5	**Data Collection and Analysis :** Obtaining Data, Data Format, Representing Unpredictable Variability, Distributions, Bootstrapping,	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Fitting Statistical Distributions to Empirical Data	
6	**Verification, Validation, and Accreditation:** Definition and concepts, Difficulties, Confidence as Validity. Conceptual Model Validation, Data Validation, White-Box Validation, Black-Box Validation, Experimentation Validation, Solution Validation, Independent Verification and Validation	8
Total lectures		42

Suggested Text Book(s):

1. Modeling and Simulation: Exploring Dynamic System Behavior, Authors: Birta, Louis G., Arbez, Gilbert
2. Simulation (5th Edition) , Authors: Sheldon Ross.

Suggested Reference Book(s):

1. MODELING AND SIMULATION FUNDAMENTALS Theoretical Underpinnings and Practical Domains by John A. Sokolowski Catherine M. Banks.
2. Science in the Age of Computer Simulation by ERIC WINSBERG
3. Modeling and Simulation: The Computer Science of Illusion. By Raczynski, S..

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106104019/
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106104019/1
   ii. https://nptel.ac.in/courses/106104019/4
   iii. https://nptel.ac.in/courses/106104019/26
   iv. https://nptel.ac.in/courses/106104019/2Ev

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Data Simulation and Modeling Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	2	1	3	3	2	3	3	3	2.5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-2	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-3	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-4	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-5	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-6	3	3	3	1	2	3	3	3	3	3	3	3	**2.8**
Average	**3**	**3**	**3**	**2.3**	**2**	**2**	**3**	**3**	**2.2**	**3**	**3**	**3**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Operating System

COURSE CODE: 18B11CI411

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: C/C++

Course Objectives:

1. To learn the mechanisms of OS to handle processes and threads and their communication.
2. To learn the mechanisms involved in memory management in contemporary OS.
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
4. To know the components and management aspects of concurrency management.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	An appreciation of the role of an operating system.	Familiarity
CO-2	Create processes and threads.	Assessment
CO-3	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.	Assessment
CO-4	For a given specification of memory organization develop the techniques for optimally allocating memory to processes by Increasing memory utilization and for improving the access time	Assessment
CO-5	Design and implement file management system.	Assessment
CO-6	For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. .	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	4
2	**Process:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.	4
3	**Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, Priority, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF	4
4	**Inter-process Communication:** Critical Section, Race Conditions, Mutual	10

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

	Exclusion, Hardware Solution, Strict Alternation, Peterson"s Solution, Lamport"s Bakery Algorithm, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader"s & Writer Problem, Dinning Philosopher Problem etc.	
5	**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker"s algorithm, Deadlock detection and Recovery.	4
6	**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.	6
7	**Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	5
8	**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms. **File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. **Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.	5
Total lectures		**42**

Suggested Text Book(s):

1. "Operating System Concepts" 9th Edition by Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. "Operating Systems: Internals and Design Principles" 9th Edition, William Stallings, Pearson.

Suggested Reference Book(s):

1. "Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. "Operating Systems: A Modern Perspective" 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India.
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106108101//
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106106144/
   ii. https://www.class-central.com/course/udacity-introduction-to-operating-systems-3419

Evaluation Scheme:

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Operating System)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Software Engineering

COURSE CODE: 18B1WCI639

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Computer Programming, Data Structures and Computer Architecture.

Course Objective:

1. Be successful professionals in the field with solid fundamental knowledge of software engineering.
2. Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn common lifecycle processes and requirement engineering concept	Familiarity
CO-2	To Design a solution to a given problem and implement the design in a programming language.	Assessment
CO-3	Understand Software Project Management	Assessment
CO-4	To learn the concept of recognizing, defining and estimating software attributes	Assessment

Course Contents:

Unit	Contents	Lectures required
1	• Introduction to software process models (e.g., waterfall, incremental, agile) • Activities within software lifecycles • Evaluation of software process models • Software quality concepts • Process improvement • Software process capability maturity models • Software process measurements	3
2	• Team participation • Effort Estimation • The role of risk in the lifecycle • Team Management • Project Management(Scheduling and tracking) • Software measurement and estimation techniques • Software quality assurance and the role of measurements	3
3	• Describing functional requirements using, for example, use cases or users stories • Properties of requirements including consistency, validity,	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	completeness, and feasibility • Software requirements elicitation • Describing system data using, for example, class diagrams or entity-relationship diagrams • Non-functional requirements and their relationship to software quality (cross-reference IAS/Secure • Software Engineering) • Evaluation and use of requirements specifications • Requirements analysis modelling techniques • Acceptability of certainty / uncertainty considerations regarding software / system behaviour	
4	• System design principles: levels of abstraction (architectural design and detailed design), separation ofconcerns, information hiding, coupling and cohesion, re-use of standard structures • Design Paradigms such as structured design (top-down functional decomposition), object-oriented analysisand design, event driven design, component-level design, data-structured centered, aspect oriented,function oriented, service oriented • Structural and behavioural models of software designs • Design patterns • Relationships between requirements and designs: transformation of models, design of contracts, invariants • Software architecture concepts and standard architectures (e.g. client-server, n-layer, transform centered, pipes-and-filters) • Refactoring designs using design patterns • The use of components in design: component selection, design, adaptation and assembly of components, components and patterns, components and objects (for example, building a GUI using a standard widget set) • Internal design qualities, and models for them: efficiency and performance, redundancy and faulttolerance, traceability of requirements • External design qualities, and models for them: functionality, reliability, performance and efficiency, usability, maintainability, portability • Measurement and analysis of design quality • Tradeoffs between different aspects of quality • Application frameworks • Middleware: the object-oriented paradigm within middleware, object request brokers and marshalling, transaction processing monitors, workflow systems	6
5	• Coding practices: techniques, idioms/patterns, mechanisms for building quality programs (cross-referenceIAS/Defensive Programming: SDF/Development Methods) • Coding standards • Integration strategies • Potential security problems in programs • Buffer and other types of overflows • Race conditions • Improper initialization, including choice of privileges • Checking input	6
6	• Identification related attributes • Size related attributes • Function point attribute estimation	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	• Feature point estimation • Software quality attributes • Complexity related attributes • Design & Development related attributes	
7	• Software development in the context of large, pre-existing code bases • Software change • Concerns and concern location • Refactoring • Software evolution • Characteristics of maintainable software • Reengineering systems • Software reuse • Software Maintenance & Reverse Engineering	6
8	• Software reliability engineering concepts • Software reliability, system reliability and failure behavior (cross-reference SF/Reliability Through Redundancy) • Fault lifecycle concepts and techniques • Software reliability models • Software fault tolerance techniques and models • Software reliability engineering practices • Measurement-based analysis of software reliability	6
Total lectures		**42**

Suggested Text Book(s):

1. R.S. Pressman, "Software Engineering: A Practitioner's Approach", 7Edition, McGraw Hill, 2010
2. Sommerville, "Introduction to Software Engineering", 8Edition, Addison-Wesley, 2007

Suggested Reference Book(s):

1. Ghezzi, Jazayeri and Mandrioli, "Fundamentals of Software Engineering", 2Edition, Prentice-Hall, 2003
2. Peters and Pedrycz, "Software Engineering: An Engineering Approach, John Wiley, 2004
3. Len Bass, "Software Architecture in Practice", 2Edn. Addison Wesley, 2003
4. Allamaraju, "Professional Java Server Programming", Apress, 2004
5. Eric Gamma, "Design Patterns: Elements of Reusable OO Software", 1994
6. A concise introduction to software Engineering, Pankaj Jalote, Springer
7. Software Engineering, Nasib Singh Gill, Khanna Publishing House
8. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International

Other useful resource(s):

1. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://www.cs.cornell.edu/Courses/cs5150/2013fa/
3. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j- software-engineering-concepts-fall-2005/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	3
CO 2	3	3	3	3	3	3	2	3	3	1	1	3	2.7
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	2.2
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	1.7
Average	2.5	2.5	3	3	2.3	2.3	2.5	2.3	2.3	1.7	1.5	1.5	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:

   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements

2. Link to topics related to course:

   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	**2.4**
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	**2.3**
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	**2.5**
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	**2.4**
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	**2.7**
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	**2.6**
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	**2.5**
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Software Engineering

COURSE CODE: 18B1WCI639

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Computer Programming, Data Structures and Computer Architecture.

Course Objective:

1. Be successful professionals in the field with solid fundamental knowledge of software engineering.
2. Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn common lifecycle processes and requirement engineering concept	Familiarity
CO-2	To Design a solution to a given problem and implement the design in a programming language.	Assessment
CO-3	Understand Software Project Management	Assessment
CO-4	To learn the concept of recognizing, defining and estimating software attributes	Assessment

Course Contents:

Unit	Contents	Lectures required
1	• Introduction to software process models (e.g., waterfall, incremental, agile) • Activities within software lifecycles • Evaluation of software process models • Software quality concepts • Process improvement • Software process capability maturity models • Software process measurements	3
2	• Team participation • Effort Estimation • The role of risk in the lifecycle • Team Management • Project Management(Scheduling and tracking) • Software measurement and estimation techniques • Software quality assurance and the role of measurements	3
3	• Describing functional requirements using, for example, use cases or users stories • Properties of requirements including consistency, validity,	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

	completeness, and feasibility • Software requirements elicitation • Describing system data using, for example, class diagrams or entity-relationship diagrams • Non-functional requirements and their relationship to software quality (cross-reference IAS/Secure • Software Engineering) • Evaluation and use of requirements specifications • Requirements analysis modelling techniques • Acceptability of certainty / uncertainty considerations regarding software / system behaviour	
4	• System design principles: levels of abstraction (architectural design and detailed design), separation ofconcerns, information hiding, coupling and cohesion, re-use of standard structures • Design Paradigms such as structured design (top-down functional decomposition), object-oriented analysisand design, event driven design, component-level design, data-structured centered, aspect oriented,function oriented, service oriented • Structural and behavioural models of software designs • Design patterns • Relationships between requirements and designs: transformation of models, design of contracts, invariants • Software architecture concepts and standard architectures (e.g. client-server, n-layer, transform centered, pipes-and-filters) • Refactoring designs using design patterns • The use of components in design: component selection, design, adaptation and assembly of components, components and patterns, components and objects (for example, building a GUI using a standard widget set) • Internal design qualities, and models for them: efficiency and performance, redundancy and faulttolerance, traceability of requirements • External design qualities, and models for them: functionality, reliability, performance and efficiency, usability, maintainability, portability • Measurement and analysis of design quality • Tradeoffs between different aspects of quality • Application frameworks • Middleware: the object-oriented paradigm within middleware, object request brokers and marshalling, transaction processing monitors, workflow systems	6
5	• Coding practices: techniques, idioms/patterns, mechanisms for building quality programs (cross-referenceIAS/Defensive Programming; SDF/Development Methods) • Coding standards • Integration strategies • Potential security problems in programs • Buffer and other types of overflows • Race conditions • Improper initialization, including choice of privileges • Checking input	6
6	• Identification related attributes • Size related attributes • Function point attribute estimation	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	• Feature point estimation • Software quality attributes • Complexity related attributes • Design & Development related attributes	
7	• Software development in the context of large, pre-existing code bases • Software change • Concerns and concern location • Refactoring • Software evolution • Characteristics of maintainable software • Reengineering systems • Software reuse • Software Maintenance & Reverse Engineering	6
8	• Software reliability engineering concepts • Software reliability, system reliability and failure behavior (cross-reference SF/Reliability Through Redundancy) • Fault lifecycle concepts and techniques • Software reliability models • Software fault tolerance techniques and models • Software reliability engineering practices • Measurement-based analysis of software reliability	6
Total lectures		**42**

Suggested Text Book(s):

1. R.S. Pressman, "Software Engineering: A Practitioner's Approach", 7Edition, McGraw Hill, 2010
2. Sommerville, "Introduction to Software Engineering", 8Edition, Addison-Wesley, 2007

Suggested Reference Book(s):

1. Ghezzi, Jazayeri and Mandrioli, "Fundamentals of Software Engineering", 2Edition, Prentice-Hall, 2003
2. Peters and Pedrycz, "Software Engineering: An Engineering Approach, John Wiley, 2004
3. Len Bass, "Software Architecture in Practice", 2Edn. Addison Wesley, 2003
4. Allamaraju, "Professional Java Server Programming", Apress, 2004
5. Eric Gamma, "Design Patterns: Elements of Reusable OO Software", 1994
6. A concise introduction to software Engineering, Pankaj Jalote, Springer
7. Software Engineering, Nasib Singh Gill, Khanna Publishing House
8. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International

Other useful resource(s):

1. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://www.cs.cornell.edu/Courses/cs5150/2013fa/
3. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j-software-engineering-concepts-fall-2005/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	3
CO 2	3	3	3	3	3	3	2	3	3	1	1	3	2.7
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	2.2
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	1.7
Average	2.5	2.5	3	3	2.3	2.3	2.5	2.3	2.3	1.7	1.5	1.5	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Modern Analog and Digital Communication

COURSE CODE: 18B11EC413

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: None

Course Objectives:

1. Introduce students to basic concepts of analogue and digital communicationsystems.
2. To acquaint the students with various modulation and demodulation techniquesused for communication.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO1	To familiarize students with the fundamentals of analog and digital communication systems.	Familiarity
CO2	To familiarize students with basic techniques used for modulation and demodulation of signal.	Familiarity
CO3	Understanding of various approaches to convert analog signal to digital signal.	Assessment
CO4	Analyze mathematical background for communication signal analysis.	Assessment
CO5	To analyze performance of a communication system.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Review of fundamental concepts: Review of Fourier series and Fourier transforms, Power Spectral Density, review of probability and random processes, spectral analysis, Gaussian process, Gaussian and white noise characteristics.	4
2	Modulation techniques: Concept of modulation and demodulation, Continuous wave (CW) modulation: AM, DSB, SSB, and VSB modulation, Angle modulation - PM & FM wave equations; relationships between PM and FM. Narrow band FM. Spectra of AM and FM waves. AM and FM detectors. Phase Lock loop (PLL) and its application as FM demodulator, Discriminator, FM Pre-emphasis and De-emphasis, capture effect. Comparison of CW modulation systems. Receivers for CW modulation: Superheterodyne receivers	13
3	Pulse modulation: Sampling process, Pulse modulation: Pulse amplitude modulation (PAM); pulse width modulation (PWM); pulse position modulation (PPM), Quantization, Pulse code modulation (PCM), differential pulse code modulation (DPCM); delta modulation (DM). Noise consideration in PCM and DM. Line coding schemes, Comparison of RZ, NRZ, Polar, Unipolar, Manchester, and their spectral analysis.	7
4	Baseband Pulse Transmission: Baseband transmission, matched filter, probabilty of error of matched filter, Inter symbol Interference and Nyquist criterion, Eye-pattern, Signal to noise ratio.	5
5	Pass band Digital Modulation schemes: Amplitude shift keying (ASK), Phase shift keying (PSK), Frequency shift keying (FSK) and Quadrature amplitude modulation (QAM). Basics of CPFSK and MSK, Signal constellations, Probability of error analysis of digital modulation schemes. Comparison of bandwidth and bit rate of digital modulation schemes. Multiplexers, Timing and frequency synchronization: TDM, FDM, North American Digital Hierarchy, T1 carrier, carrier synchronizers, symbol synchronization, early late gate synchronizer	13
	Total lectures	42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Simon Haykin, "An introduction to analog and digital communications", 2nd Ed., John Wiley & Sons,2012
2. B.P.Lathi, "Modern Analog and Digital Communication Systems", 4th Ed., Oxford.,2017
3. Taub Schilling, "Principles of Communication Systems", 4th Ed., McGrawHill.,2007

Other useful resource(s):

1. https://nptel.ac.in/courses/117101051/ (Prof. Bikash Kumar Dey, IIT Bombay)
2. https://onlinecourses.nptel.ac.in/noc17_ec11/preview (Prof. Goutam Das, IIT Kharagpur)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Modern Analog and Digital Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO-6	PO 7	PO 8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	1	2	2	2	1	1	1	1	2	1	2	1.58
CO2	2	3	2	2	2	1	1	1	1	2	1	2	1.67
CO3	3	3	3	2	2	2	2	1	2	2	1	1	2.00
CO4	2	2	3	3	2	1	1	2	1	2	1	2	1.83
CO5	3	3	3	2	3	1	1	1	1	2	2	2	2.00
Average	2.6	2.4	2.6	2.2	2.2	1.2	1.2	1.2	1.2	2	1.2	1.8	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Computer Aided Drug Design

COURSE CODE: 18B11BI612

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: None

Course Objectives:

1. To design potential lead molecules against any disease that may be explored further as a potential candidate for the drug development.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Feasibility study of a drug development project	Familiarity
CO-2	Design and optimize lead molecules against drug target, and using ligand-basedapproach	Usage
CO-3	Determination of pharmacophore from lead molecules and active sites and use ofpharmacophore for lead discovery	Usage
CO-4	Development of potential drug molecule and pharmacophore databases for virtualscreening	Assessment
CO-5	Use of molecular fragments for lead discovery and implementation of statisticalapproaches for lead molecule discovery	Usage
CO-6	Bioavailability prediction of a drug and working capability in drug designing softwarelike, Discovery Studio and molecular dynamics software like AMBER 8.0, On-line tools, etc.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Drug design: A billion dollar baby and drug design techniquesteam work, Economic factors involved in drug design, Irrational vs.	4
	rational approaches, Drug target identification & computer-aided drug design processes, Case study related to drug target identification (Viral Targets -HIV Example)	
2	**Computational Approaches to Drug Design:** Structure-based (receptor fitting)and ligand-based (receptor mapping) molecule design, lead molecules design in a research environment (crossing the barriers), tools used in both environments	3
3	**Receptor Fitting (Lead discovery& refinement)**: Utility, Binding-site predictions: Stereoelectronic factors, receptor flexibility, tight binding; Docking: Introduction, search algorithms, scoring (MM, Grid, etc.), validation of results, comparisons of search and scoring methods; Docking processes and analysis of results; *De novo* design, database searching & high throughput virtual screening(HTVS); and applications. Introductions to docking & molecular modeling packages (DS Studio; Schrodinger Inc, Ligbuilder, etc.)	9
4	**Receptor Fitting (Lead optimization)**: Molecular simulation methods used for binding and free energy calculation, Calculation on Free Energy Perturbation(FEP) of 1. Thermolysin with 2 ligands, Molecular mechanics Poisson-Boltzmann surface area methods: molecular basis of HIV protease drug	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	resistance	
5	**Receptor Mapping (Pharmacophore)**: The pharmacophore concept, Determination of pharmacophore from a set of active molecules, Design of pharmacophore using various algorithms, Creating pharmacophore model from active site, Practical utility (searching compound databases) and A case study of new lead design	5
6	**Chemoinformatics:** Introduction, representing 2D & 3D structures, 2D chemical database applications & molecular descriptors and their classifications, database searching and applications in CADD	4
7	**Receptor Mapping (Quantitative structure activity relationship (QSAR))**: QSAR methodology, biological and physicochemical parameters, feature selection(PLS, PCA, MLR, etc.), model building and validation, QSAR applications in drug design, Quantitative structure-property relationships (QSPR), CoMFA, 3D and nD-QSAR methods	6
8	**Fragment-based Lead Discovery**: Fragment and substructure discovery and evaluation, virtual fragment scanning (trends, applications and web-based tools) & capture methods for fragment-based discovery	4
9	**ADMET**: Oral bioavailability, drug half-life in the bloodstream, BBB permeability, toxicity, Lipinski rule of five, The impact of physiochemical properties on the control of drug-like properties.	4
Total Lectures		**42**

Suggested Text Book(s):

1. David C Young : Computational Drug Design (A guide for computational and medicinal chemists) Wiley & Sons, Inc., New Jersey, USA
2. Holtje H.-D, Sippl W., Rognan D. and FolkersG. : Molecular Modeling, Basic Principles and Applications Wiley-VCHGmbH& Co. KGaA
3. Leach AR : Molecular Modeling: Principles and Applications: Prentice Hall, Edinburg UK.
4. Zartler ER & Shapiro MJ : Fragment-based Drug Discovery (A practical approach), Wiley & Sons, Inc., West Sussex, UK Flower DR : Drug design: cutting edge approaches, RSC publication, Cambrige, UK

Suggested Reference Book(s):

1. Merz KM, D Ringe, : Drug Design: Structure and Ligand-based Approaches. Reynolds CH Cambridge University Press
2. Opera TI :Chemoinformatics in Drug Discovery, Wiley-VCH, GMBH
3. Hubbard RE : Structure-based drug discovery (An overview), RSC publication, Cambrige, UK

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
CO2	3	3	3	3	3	1	1	1	1	1	1	3	**2.00**
CO3	3	3	2	3	2	3	2	1	1	1	2	1	**2.00**
CO4	3	3	3	2	3	2	1	1	1	1	1	1	**1.83**
CO5	2	2	3	3	3	3	1	1	1	1	1	1	**1.83**
C06	2	3	3	3	2	2	2	2	2	2	2	2	**2.25**
Average	**2.67**	**2.83**	**2.80**	**2.80**	**2.60**	**2.20**	**1.20**	**1.00**	**1.00**	**1.00**	**1.20**	**1.40**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Machine learning for Bioinformatics

COURSE CODE:18B11BI611

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Molecular biology, Python

Course Objectives:

1. Learn what is machine learning
2. Learn algorithms used in machine learning.
3. Learn how to implement machine learning for biological problems.
4. Apply machine learning to practical projects.
5. Use machine learning and data mining in one project.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Different types of machine learning and its utility in bioinformatics	Familiarity
CO-2	Application of Hidden Markov Model and Artificial neural networks to different types of bioinformatics data	Assessment
CO-3	Determination of Bayesian Network (BN) from expression data.	Assessment
CO-4	Application of symbolic machine learning (SML) methods to predict cleavage site of HIV- protease from training data of positive and negative cases.	Assessment
CO-5	Optimization of weights in a supervised and unsupervised neural network, and application of supervised learning to predict sub- cellular localization of a protein.	Assessment
CO-6	Application of stochastic context-free grammar (SCFG) to predict RNA secondary structure.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Overview of intelligent systems and machine learning	1
2	**Hidden Markov Model (HMM):** Viterbi algorithm, Forward algorithm,	10
	Backward algorithm, Profile-HMM, Baum-Welch algorithm to optimize HMM-profile, Multiple alignment and database searching using profile- HMM	
3	**Symbolic Machine Learning:** Nearest neighbour approach to predict secondary structure, Decision tree methods, Identification tree methods	6
4	**Bayesian Network (BN):**Calculation of statistical significance by using Bayesian methods, Factorization and Markov blanket rule, d-separation, Equivalence classes, Learning of Bayesian network, Learning of Gaussian network	9
5	**Artificial Intelligence (AI):**Search strategies, logic, deduction, and pathways comparison	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Approved in Academic Council held on 25.10.2018

6	**Artificial Neural Network (ANN):**Basics and introduction to terminologies, Supervised and non-supervised learning, Feed forward back propagation error method, Application of ANN methods: Protein sub-cellular localization and secondary structure prediction	7
7	**Stochastic Context Free Grammar (SCFG):**Transformational grammar, Parsing, Chomsky hierarchy (regular, context-free, context-sensitive, and unrestricted grammar), Automata, Context-free grammar, Application of SCFG for prediction of secondary structure of RNA	5
Total Lectures		42

Suggested Text Book(s):

a. R. Durbin, S. Eddy, A. Krogh, and G. Mitchison (1998), Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press
b. Edward Keedwell and Ajit Narayanan (2005), Intelligent Bioinformatics: The Application of Artificial Intelligence Techniques to Bioinformatics Problems, Wiley
c. P Baldiand S Brunak, BIOINFORMATICS: The Machine Learning Approach

Suggested Reference Book(s):

1. Olson et al., 2018. Data-driven advice for applying machine learning to bioinformatics problems
2. Husmeier D, Dybowski R, and Roberts S (2005), Probabilistic Modeling in Bioinformatics and Medical Informatics, Springer
3. Nat Cell Biol. 2001 Aug;3(8):E190-5. Review. PubMed PMID: 11483980
4. Kim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE, Seidman JG. Polony multiplex analysis of gene expression (PMAGE) in mouse hypertrophic cardiomyopathy. Science. 2007 Jun 8;316(5830):1481-4. PubMed PMID: 17556586
5. MacBeath G, Schreiber SL. Printing proteins as microarrays for high-throughput function determination. Science. 2000 Sep 8;289(5485):1760-3. PubMed PMID: 10976071.
6. Shankar J, Wu TD, Clemons KV, Monteiro JP, Mirels LF, et al. (2011) Influence of 17b-Estradiol on Gene Expression of Paracoccidioides during Mycelia-to- Yeast Transition. PLoS ONE 6(12): e28402. doi:10.1371/journal.pone.0028402
7. Mary V. Relling, William E. Evans Nature. Author manuscript; available in PMC 2016 Jan 13.
8. Published in final edited form as: Nature. 2015 Oct 15; 526(7573): 343–350. doi: 10.1038/nature15817

Other useful resource(s):

1.Link to NPTEL course contents:https://nptel.ac.in/courses/106104019/

2.Link to topics related tocourse:

i. https://www.advancedsciencenews.com/machine-learning-for-bioinformatics-and-neuroimaging/
ii. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm
iii. https://www.analyticsvidhya.com/blog/2017/09/understaing-support-vector-machine-example-code/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 25.10.2018

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Machine learning for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	**1.92**
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	**1.75**
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	**1.73**
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	**1.73**
CO-5	2	2	2	2	2	1	1	1	2	-	-	2	**1.7**
CO-6	2	2	2	2	2	1	1	1	-	-	-	2	**1.67**
Average	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**1.16**	**1.16**	**1.33**	**2.0**	**2.0**	**1.33**	**2.0**	

Assistent Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Programming Languages for Bioinformatics

COURSE CODE:18B11BI414

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To familiarize and master the programming skills in Perl and Python.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Write and execute a script in Perl.	Usage
CO-2	Enable routine and module calls and their implementation using Bioperl.	Familiarity
CO-3	Able to formulate stepwise implementation of a Perl script (from developing a pseudo-code to execute a successful bug-free code) for a given problem in Bioinformatics.	Usage
CO-4	Write and execute a script in Python.	Usage
CO-5	Enable routine and module calls and their implementation using Biopython.	Familiarity
CO-6	Able to formulate stepwise implementation of a Python script (from developing a pseudo-code to execute a successful bug-free code) for a given problem in Bioinformatics.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Crash course in C	2
2	Programming basics	1
3	Sequences and Strings: Storing a DNA sequence, Concatenation, Transcription, Translation	2
4	Arrays and Scalar list, Strings to Array, Operations on Strings	2
5	Subroutines and Command line arguments	3
6	Modules, Calling modules	2
7	Hashes, Data Structures in Perl	4
8	Reading files and writing output formats	3
9	Regular expressions and Perl Operations	3
10	Parsing genbank, PDB, BLAST, and other file formats	3
11	Object-oriented programming, Complex Data Structures, Relational Databases	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

12	BioPerl	3
13	Introduction to Python	3
14	BioPython	4
15	Applications of Python and BioPython	3
Total lectures		**42**

Suggested Text Book(s):

a. Beginning Perl for Bioinformatics By James Tisdall, O'Reilly Media (2001)
b. Mastering Perl for Bioinformatics By James Tisdall, O'Reilly Media (2003)
c. Python For Bioinformatics By Sebastian Bassi, Chapman and Hall (2010)

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
CO2	3	3	3	3	3	1	1	1	1	1	1	3	**2.00**
CO3	3	3	2	3	2	3	2	1	1	1	2	1	**2.00**
CO4	3	3	3	2	3	2	1	1	1	1	1	1	**1.83**
CO5	2	2	3	3	3	3	1	1	1	1	1	1	**1.83**
CO6	2	3	3	3	2	2	2	2	2	2	2	2	**2.25**
Average	**2.67**	**2.83**	**2.80**	**2.80**	**2.60**	**2.20**	**1.20**	**1.00**	**1.00**	**1.00**	**1.20**	**1.40**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Advanced Concrete Technology

COURSE CODE: 10B13CE744

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Concrete Technology

Course Objectives:

1. To prepare the graduates as best civil engineers with an excellent comprehension of fundamentals of concrete structure at micro and macro levels and applications of different types of cement and concretes.
2. To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.
3. Study and understand the procedure of mix design for production of ultra-high strength concrete by the use of particle packing concepts.
4. To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete
5. To understand the fundamentals of self-compacting concrete and its testing for different properties.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To study the basic fundamentals, classifications and applications of polymer concrete, fiber reinforced concrete.	Familiarity
CO-2	To study the mechanism, effect and optimization of dosage of mineral and chemical admixtures to produce Ultra high strength concrete.	Assessment
CO-3	Study and Understand the procedure of mix design for production of ultra high strength concrete by the use of particle packing concepts.	Assessment
CO-4	To study the mixing techniques with mineral and chemical admixture to produce polymer concrete and ultra high strength concrete.	Usage
CO-5	To understand the basic fundamentals of self compacting concrete and its testing for different properties.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction to polymer concrete- its classification and applications.	14
2	**Ultra high strength concrete:** basic fundamentals. Types, application and production.	4
3	**Mix design of Polymer concrete and UHPC:** Introduction of particle packing concept, optimization of granular mixture and how to design for a mixture to increase the homogeneity of the mixture.	8
4	**Self compacting concrete:** Mix design, testing, production and application.	4
5	**Mineral and chemical admixtures**: Optimization and selection of a particular type of mineral and chemical admixture.	12
Total lectures		42

Suggested Text Book(s):

1. A.M.Neville, -Properties of Concretel, English Language Book Society/Longman Pub, 1988
2. P.K.Mehta and J.M.M.Paulo, —Concrete – Microstructure – Properties and Materiall, ICI, Indian First Edition, Reprint1999.

Suggested Reference Book(s):

1. Zonghjin Li, —Advanced Concrete Technology, John Wiley & Sons, INC, Newjersy,2011l.
2. A.R. Santhakumar, —Concrete Technologyl, Oxford University press, New Delhi,2009.
3. N.Krishna Raju, —Design of Concrete Mixl, CBS Pub.,1985.
4. Taylor, H. W. F., _Cement Chemistry,' Academic Press, Inc., San Diego, CA,1990.
5. Lea, F. M., _The Chemistry of Cement and Concrete,' Chemical Publishing Company, Inc., New York, 1971.
6. Mindess, S., and Young, J. F., _Concrete,' Prentice Hall, Inc., NJ, 1981. J. Newman and B. S. Choo,Eds., _Advanced Concrete Technology', Four Volume Set, Elsevier, 2003

Other useful resource(s):

1. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_ce21/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Advanced Concrete Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	2	1	1	3	1	1	2	2	3	3	**1.92**
CO-2	1	2	3	2	2	1	2	3	3	1	3	2	**2.08**
CO-3	3	3	3	2	1	1	2	3	2	2	3	2	**2.25**
CO-4	3	2	1	3	1	2	3	3	2	3	3	2	**2.33**
CO-5	2	3	3	3	1	3	1	2	2	3	3	2	**2.33**
Average	**2.4**	**2.2**	**2.4**	**2.2**	**1.2**	**2**	**1.8**	**2.4**	**2.2**	**2.2**	**3**	**2.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Air and Noise Pollution and Control

COURSE CODE: 10B13CE742

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn history of air pollution, definition of air pollution, and source and classification of air pollution.
2. Learn the effects of air pollutants on human health, vegetation and materials and major control devices to control air pollution problems.
3. Learn dispersion phenomenon of air pollutants covering diffusion and advection, meteorological components, stability of atmosphere and corresponding plume shapes.
4. Learn an overview of noise pollution including methods for prevention, control, measures and management of the pollution.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn the air pollution issues and characterize the elements of air pollution.	Familiarity
CO-2	Solve and design complex problems related to dispersion and air quality modeling.	Assessment
CO-3	Apply relevant techniques and methods for control, and prevention of air pollution	Assessment
CO-4	Develop an overview understanding of the strategies, regulations and policies to manage air and noise pollution.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** The earth's atmosphere: structure and composition.	3
2	**Definition and Elements:** Air pollution: definitions: types of pollutants, sources; effect of air pollution on health, environment and materials; air pollution episodes.	5
3	**Meteorology:** Air pollution meteorology: atmospheric circulation patterns, atmospheric stability and vertical mixing, lapse rate and	6

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	temperature inversions.	
4	**Dispersion Modelling:** Atmospheric dispersions modelling: atmospheric stability classes, Gaussian model, estimation of downwind concentrations, plume rise, tall stacks, and critical wind speed.	8
5	**Control of Particulate Matters:** Control of particulate Matter: characteristics of particles drag force, impaction, interception and diffusion. Cyclones, Electrostatic precipitators, Fabric filter, Particulate scrubbers, spray-chambers, cyclone spray chambers, orifice and wet-impingement scrubbers, venturi and venture-jet scrubbers.	6
6	**Control of Gaseous Emissions:** Control of gaseous emissions: gas-liquid and gas solid equilibrium, solubility, absorption, and kinetics. Gas absorption: physical and chemical absorption, isotherms, and absorption potentials.	6
7	**Legislation and Regulations:** Air Pollution Control Act, National Environmental Policy Act, Ambient Air Quality Standards.	4
8	**Noise Pollution:** Noise pollution definition, prevention and control measures, management of pollution.	4
Total lectures		42

Suggested Text Book(s):

1. H.S. Peavy, D.R. Row and G. Tchobanoglous, Environmental Engineering, Mc Graw Hill International Edition.
2. Air Pollution, M. N. Rao and H.V.N. Rao, Tata Mc Graw Hill.
3. Wark, K., & Warner, C. F. (1981). Air pollution: its origin and control.

Suggested Reference Book(s):

1. Atmospheric Pollution: History, Science, and Regulation, by Mark Z. Jacobson, Cambridge University Press, Cambridge, 2002.
2. Air Quality, by Thad Godish, 4th Edition, Lewis Publishers, 2003.
3. Atmospheric Chemistry and Physics, by John Seinfeld and Spyros Pandis, John Wiley & Sons, 1997.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105102089/
2. Link to topics related tocourse:https://nptel.ac.in/courses/105104099/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Civil Engineering

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Air and Noise Pollution and Control)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	1	1	1	1	1	2	x	x	x	2	**1.33**
CO-2	2	3	3	3	3	2	x	1	2	1	x	1	**2.1**
CO-3	2	3	3	3	3	2	2	1	2	1	x	1	**2.1**
CO-4	2	1	1	2	1	1	2	2	2	1	1	2	**1.5**
Average	**2**	**2**	**2**	**2.25**	**2**	**1.5**	**1.67**	**1.5**	**2**	**1**	**1**	**1.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Antibody Engineering Technologies

COURSE CODE: XXXXXXX

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Immunology

Course Objective:

The objective of the course is to offer students insight into the understanding of monoclonal antibody engineering for practical use in medicine and biotechnology.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The students would have knowledge of monoclonal antibodies for practical use in medicine and biotechnology.	Familiarity
CO-2	The students would have in-depth knowledge of generation of mouse, chimeric, humanized and human monoclonal antibodies.	Assessment & Technical
CO-3	The students would have in-depth knowledge of screening strategies which can be used with mouse, chimeric, humanized and human monoclonal antibodies.	Assessment & Technical
CO-4	The students would have sound knowledge modification of existing human proteins and antibodies and their therapeutic applications.	Assessment & Technical
CO-5	The students would have sound knowledge modification of existing human proteins and antibodies and their diagnostic applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Antibody Structure and Function:** Basic structure and fine structure of Ig's including domain structure of antibody, immunoglobin classes and subclass. Immunogenicity, affinity, stability, effector functions, half-life, and tissue penetration and distribution. Genetic Rearrangement of IgSF.	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Traditional methods for Antibody Productions:** Monoclonal antibodies, Hybridoma Technology, Applications of Monoclonal antibodies in therapy and diagnosis, drawbacks and limitations of Monoclonal antibodies.	5
3	**Murine, Chimeric, Humanized and Human Antibodies:** Approaches for construction and generation of chimeric and humanized antibody, HAMA and HACA, Generation of fully human monoclonal antibodies – methods and procedures.	4
4	**Selecting and screening recombinant antibody libraries:** Recombinant antibody libraries, Expression of antibody in bacteria, Phage display technology for screening antibody libraries, screening and generation of transgenic mice for antibody production.	6
5	**Antibody libraries** - Immune Library, Naive library, Synthetic library, Semisynthetic library, high throughput screening of libraries.	3
6	**Regulatory issues for the development of antibody, Patents related to antibodies.**	1
7	**Engineered Antibodies for therapy and diagnosis:** Antibody fragments, immuno, prodrug and toxin conjugates of antibodies, Antibodies against tumors, cancers and other diseases, prospects and challenges for immuno-conjugates.	8
8	**FDA approved Recombinant antibodies in the clinic:** Orthoclone, Rituxan, Zenapax, Humira, CDP571, IDEC-CE9.1. etc	8
Total Lectures		**42**

Suggested Text Book(s):

1. Fathimunisa Begum, "*Monoclonal Antibodies: the hopeful drugs*", Chennai: MJP Publishers, 2008.

Suggested Reference Book(s):

1. John McCafferty, H. R. Hoogenboom, D. J. Chiswell, "*Antibody Engineering: a practical approach*", Oxford University Press, New Delhi, 2002.
2. Lo, Benny K. C, "*Antibody Engineering: methods and protocols*", Totowa: Humana Press, 2004. ***(e-book)***
3. William J. Harris, John R Adair, "*Antibody Therapeutics*", New York: CRC Press, 1997.

Assistant Professor (Senior Grade)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4. Steven J Shire, Wayne Gombotz, James Andya, "*Current Trends in Monoclonal Antibody Development and Manufacturing*", New York: Springer Verlag, Netherlands, 2010.
5. Nature Biotechnology: Volume 23 Number 9 September, 2005.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Antibody Engineering Technologies)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	1	3	2	3	-	-	-	-	-	3	2.42
CO-2	3	3	3	1	3	1	-	-	1	-	-	1	2
CO-3	3	2	3	1	2	1	-	-	1	-	-	1	1.75
CO-4	1	3	2	1	3	2	-	-	3	-	-	3	2.25
CO-5	1	2	3	1	3	1	-	-	3	-	-	3	2.12
Average	2.2	2.4	2.4	1.4	2.6	1.6	-	-	2	-	-	2.2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Artificial Intelligence

COURSE CODE: 18B1WCI742

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structure, Discrete Structure

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction:** Intelligence, Definitions of Intelligent Agents **Single-Agent Search:** Breadth-first, Depth-first and Iterative Deepening Search, Heuristic Search (A* search), Stochastic Local Search (Simulated Annealing, Genetic algorithms)	7
2	**Adversarial Search:** Minimax Search, Alpha-beta pruning, Stochastic Games and Expectiminimax **Knowledge Representation and Logic:** Propositional Logic, Propositional Inference , First-Order Logic, Propositional Inference (Forward chaining, Backward chaining)	7
3	**Reasoning Under Uncertainty:** Probability Bayes Rule , Bayesian Networks, Bayesian Inference	7
4	**Machine Learning**: Definition and examples of broad variety of machine learning tasks, including classification, Inductive learning, Simple statistical-based learning, such as Naive Bayesian Classifier, decision trees, The over-fitting problem, Measuring classifier accuracy	11
Total lectures		**32**

Suggested Text Book(s):

1. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
2. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Machine Learning by Tom M. Mitchell
3. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb

Other useful resource(s):

1. Link to NPTEL course contents:
   - i. https://nptel.ac.in/courses/106105077/
   - ii. https://nptel.ac.in/courses/106105079/
2. Link to topics related to course:
   - i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   - ii. https://ai.google/education/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Artificial Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	2	1	2	1	2	2	2	1.9
CO-2	3	3	3	1	3	2	1	2	1	2	3	2	2.2
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Weightage	3	3	3	2.2	2	1.4	1.6	2	1.6	2	2.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	Bioenergy and Biofuels	**(Elective Course)**
Course Code	14B1WBT731	
Course Credit	3	

L	T	P
3	0	0

Course Coordinator	Dr. Garlapati Vijay Kumar
Pre-requisite	Microbiology, Bioprocess Engineering, Downstream Processing, Bioresource Technology

Course Objectives

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economical issues related to first, second and third generation biofuels along with Physico chemical techniques

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-3.5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels
CO II	Technical barriers in Bioenergy and Biofuel Technology
CO III	Whole biorefinery approaches for economical implementation into the market
CO IV	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy
CO V	Conversion of waste and Mixed feedstock to Biofuels, Bioenergy and Bioproducts

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction to Biofuels and Bioenergy	Definition, Global Energy Outlook, Sustainability, Biomass Feedstocks, Processes and Technologies, Environment and Ecology	4
2	Crop Oils, Biodiesel, and Algae Fuels	Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel	12
3	Ethanol from Corn and Lignocellulosics	Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-to-Ethanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction.	12
4	Fast Pyrolysis and Gasification of Biomass	Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas	7
5	Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock	Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock.	7
		Total Number of Lectures	**42**

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and case studies will also be given.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

TEXT BOOKS

1	Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press
2	Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers .

REFERENCE BOOKS

1	Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	Biosensor: Principle and application	**(Core Course)**		
Course Code	18B1WBT731			
		L	**T**	**P**
Course Credit	3	3	0	0
Course Coordinator	Dr. Abhishek Chaudhary			
Pre-requisite	Basics of Physics, chemistry and biology			

Course Objectives

This course introduces students to the highly interdisciplinary field of biosensors. Introduce the concept of biosensors, design and fabrication, types and their applications.

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-4
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Semester	Inform class time to time
Total	**100**		

Course Outcomes

CO I	Able to understand the fundamentals of biosensors: Types, characteristics, operating condition and applications.
CO II	To develop a fundamental concept of molecular reorganization for biosensor development.
CO III	Able to understand the basics principle related with bioinstrumentation and electrochemical sensor fabrication.
CO IV	Able to understand the basics principle related with bioinstrumentation and optical and nanosensor fabrication.
CO V	Fundamental understanding of sensor application in medicine, health, agriculture, environment and food science.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction	Overview of biosensor and applications: medicine, agriculture, bio-production, and environment, Desired characteristics of biosensors: reliability, simplicity, cost, and related parameters, Application notes: operating conditions, calibration, positive and negative controls, safety.	6
2	Biosensors and electrochemistry	Molecular reorganization: Enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity, Fundamentals of surfaces and interfaces.	7
3	Bioinstrumentation and bioelectronics devices	Principles of Potentiometry and potentiometric biosensors, Principles of amperometry and amperometric biosensors, Electrochemical Sensors Optical Biosensors based on Fiber optics and nanomaterial. Principle of fluorescence biosensor, SPR biosensor. Introduction to electronic nose and electronic tongue. Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology	14
4	Application And uses of Biosensors	Biosensors in clinical chemistry, medicine and health care, biosensors for veterinary, agriculture and food Low cost - biosensor for industrial processes for online monitoring; biosensors for environmental monitoring. Application of enzymes in analysis; design of enzyme electrodes and their application as biosensors in industry, healthcare, food and environment. Basics of In-Vivo Biosensor, The Glucose Biosensor, Microbial Biosensor	12
5	Biosensors For Clinical Analysis	Biosensors for personal diabetes management (Glucose, Galactose, Gluconate, Lactate, Pyruvate Sensors) Noninvasive Biosensors in Clinical analysis and health care	3
		Total Number of Lectures	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Biosensors: Fundamentals and Application: Anthony P.F. Turner, Isao Karube George S. Wilson, Oxford University Press
2	Body sensor Network: Biosensors and Sensor System. Danny O'Hare g, Imperial College London, London SW7 2BY, UK
3	Introduction to biosensor: from electric circuit to immunosenssor, J.Y.Yoon, springer,-switzerland.

REFERENCE MATERIAL:

1	Biosensors and Nanobiosensors: Designand Applications, Ahmed Touhami, University of Texas at Brownsville
2	Electrochemical DNA Biosensor: M.Ozsoz. CRC press, taylor & francis group

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Business Analytics

COURSE CODE:18B1WHS632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand facets of business analytics within an organization.
2. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
3. To become familiar with the processes needed to develop, report, and analyze business data.
4. To analyze real world business problems, not only with the context of the company but also with the context of the society, with the help of modern concepts and tools and techniques of the concerned area.
5. To provide an optimal solution which benefits both the company and the society as a whole.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding the concepts and dimensions of business analytics	Familiarity
CO-2	Formulations of business analytics problems	Assessment
CO-3	Developing and reporting of the problems after proper assessment	Assessment
CO-4	Analyzing problems using different tools and techniques of business analytics	Usage
CO-5	Designing an optimal strategy to help the company	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:**Introduction and importance to Business Analytics, Categorization of Analytical Methods and Models, Business Analytics in Practice – Marketing, HR, Finance etc.	3
2	**Business Analytics Models:** Overview and Deployment of Business Analytics Models	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Exploring Data:** Describing the distribution of single variable – Types of data, categorical variables etc,; Relationships among variables – categorical variables, categorical and numerical variables and numerical variables	6
4	**Probability and Decision Making:** Probability and distributions – single random variables; Distributions – normal, binomial, poisson and exponential; Decision making under uncertainty – elements of decision analysis, precision tree, Bayes' rule, multistage decision problems; Applications in Business Management	7
5	**Statistical Inference:**Sampling and sampling distributions; Confidence Interval Estimations; Hypothesis testing; Applications in Business Management	7
6	**Regression Analysis:**Regression Analysis – Estimation; Regression Analysis – Inference; Applications in Business Management	8
7	**Simulation Modeling:** Introduction to Simulation Modeling; Simulation Models – Operations, Financials, Marketing Applications in Business Management	9
Total Number of Lectures		**42**

Suggested Text Book(s):

1. S. Christian Albright and Wayne L. Winston: Business Analytics: Data Analysis and Decision Making, Cengage Learning, 5e

Suggested Reference Book(s):

1. Jeffrey D Camm et al.: Essentials of Business Analytics, Cengage Learning
2. Halady P: Business Analytics: An Application Focus, PHI
3. Seema Acharya and R. N. Prasad: Fundamentals of Business Analytics, Wiley
4. Some real life data from different government/non-government sources will also be discussed and analysed.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1-> Unit 1, 2 and 3
2	T-2	25	1.5 Hours	Syllabus covered upto T-2->Upto T1 + Unit 4and 5 (partially)

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Attendance – 5 Class Performance - 10 Quizzes –10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Cloud Computing: Concepts, Technology & Architecture Lab

COURSE CODE: XXXXXXXX **COURSE CREDITS:** 1 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 0-0-2

Pre-requisite: Knowledge of Visualization, Web Service Architecture, Computer Architecture, Computer Networking, and Distributed Computing.

Course Objectives:

- To demonstrate various Visualization Platform.
- To demonstrate an understanding of cloud computing concepts and standards.
- To understand all enabling technologies for Cloud Deployment.
- To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	To learn the basic concepts, applications, and terminology of cloud computing.	Familiarity
CO2	To learn basic concepts of infrastructure management and load balancing.	Familiarity
CO3	To learn basic concepts of cloud security and metrics for evaluation.	Assessment
CO4	To understand cloud computing and its role in new distributed computing implementation.	Assessment

List of Experiments:

S No	Description	Hours
1	Introduction to Infrastructure as a Service Platforms like EC2 (AWS). Demonstrate the creation of a computing platform.	2
2	Demonstrate management and deployment for the IAAS platform by Remote Access platforms (Putty, remote desktop, etc).	2
3	Introduction to Visualization and its various types (Hypervisor type0 and type1).	2
4	Implementation of Visualization platforms (Sun Virtual Box, VM workstation, Zen, KVM) for Virtual Machine (VM) creation and management.	4
5	Implement and Management of various Virtual disk standards and VM imaging formats for Virtual Machine.	4
6	Implementation and installation of a Cloud management platform like	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	open-stack / Eucalyptus etc.	
7	Creating a Warehouse Application in SalesForce.com.	4
8	Implementation and Deployment of a Platform as a Service Platform like Google App engine/ Microsoft azure etc.	2
9	Installation and Configuration of Hadoop.	2
10	Introduction to Cloud Simulation Platforms Like CloudSim and Green Cloud.	2
	Total Lab hours	**28**

Suggested Reference Books:

- Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice-Hall, ISBN: 9780133387568.
- Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.
- Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter; Tata McGraw – Hill Edition
- The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
- Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
- The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos.
- Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
- Link to topics related to course:

a. https://www.edx.org/learn/cloud-computing
b. https://www.udemy.com/introduction-to-cloud-computing/
c. https://nptel.ac.in/courses/106104019/2Ev

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5	Attendance and discipline in lab		15
6	Total		100

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.8
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.8
Average	3	3	2.8	2.8	2.5	2	1.3	1	1	1	1.3	1.5	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1.	RC Gonzalez, RE Woods, "Digital Image Processing", 3rd Ed., Pearson Publisher.	2008
2.	Kayvan Najarian, Robert Splinter, "Biomedical Signal and Image Processing" 2nd Ed., CRC Press.	2012
3	Tamal Bose, "Digital Signal and Image Processing", 1st Ed., John Wiley & Sons.	2003

11. Web Resources

1	**NPTEL ONLINE COURSES** Digital Image Processing	http://www.nptelvideos.in/2012/12/digital-image-processing.html (Prof P.K. Biswas, IIT Kharagpur)

CMOS ANALOG CIRCUIT DESIGN

(Elective Subject)

Course Code:	13B1WEC731	**Semester:**	7th Semester, B. Tech (ECE)
Credits:	3	**Contact Hours:**	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. Differential Amplifier
2. Operational amplifier
3. Applications of operational amplifier
4. High gain amplifier architecture
5. Two stage CMOS operational amplifier

Course Outcomes

After studying this course the students would gain enough knowledge

1. To be aware about the designing of differential amplifier
2. configurations, equivalent circuit, parameters of an operational amplifier
3. regarding various applications of op-amp and compensation technique.
4. what are current amplifiers, output amplifiers and difference between voltage and current amplifiers
5. design of two stage CMOS operational amplifier and its applications.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

1.	Differential Amplifier, Differential amplifier circuit configurations, DIBO, DIUO, SIBO, SIUO, FET Differential Amplifier, Constant current bias bias, current mirror, cascaded differential amplifier, level translator, cascode configuration, op-amp symbol, parameters, equivalent circuit of an op-amp, configurations,	Ramakant A. Gayakwad, Chapter 1-3	10
2.	Block diagram of feedback, voltage series feedback, voltage shunt feedback, differential amplifiers, compensating networks, frequency response of internally compensated op-amps, frequency response of non compensated op-amps, high frequency op-amp equivalent circuit, closed loop frequency response, slew rate.	Ramakant A. Gayakwad, Chapter 4-6	6
3	DC and AC amplifiers, peaking amplifiers, summing, scaling, averaging amplifiers, voltage to current converter, current to voltage	Ramakant A. Gayakwad, Chapter 7-10	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	converter, integrator, differentiator, half wave circuit, full wave circuit, logarithmic amplifier, antilogarithmic amplifier, filters, oscillators, comparators, Schmitt trigger, voltage to frequency and frequency to voltage converter, A-D and D-A converter, clippers, clampers, switched capacitors, PLL		
4	Differential amplifiers, cascode amplifiers, current amplifiers, output amplifiers, high gain amplifier architectures.	Philip E. Allen, Douglas R. Holberg, Chapter 4-5	12
5	Design of CMOS op-amps, compensation, Design of two- stage op-amps, cascode op-amps, Buffered op-amps, high speed/ frequency op-amps. Differential op-amps, low voltage op-amps, low noise op-amps, high speed comparators	Philip E. Allen, Douglas R. Holberg, Chapter 6-7, Chapter 8	8
		Total Number of Lectures	44

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. Ramakant A. Gayakwad, "Op-amps and linear integrated circuits", PHI, 3rd edition.
2. Philip E. Allen, Douglas R. Holberg, "CMOS Analog circuit design", Oxford, 2nd edition.

Reference Books

1. K. Lal Kishore, "Operational Amplifiers and Linear integrated circuits", Pearson Education Asia, 2nd edition.
2. Adel S. Sedra, K. C. Smith, "Microelectronics Circuits", Oxford 5th edition International Version.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Cognitive Radio Networks

(Elective Subject)

Course Code:	14B1WEC733	Semester:	7th Sem. B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course objectives

1. To understand the spectrum scarcity problem and how cognitive radio deals with this problem.
2. The contribution of cognitive radio systems in wireless networks and its architectures that enable the development of the cognitive radio network (both centralized and distributed).
3. Technologies to allow an efficient use of TVWS for radio communications.
4. Discussion about various cognitive radio standards.
5. Understanding the various research challenges for deployment of cognitive radio network.
6. Update about current research scenario in this field

Course outcomes

Upon successful completion of this course the students will have developed following skills/abilities

1. Fundamental issues regarding dynamic spectrum access and radio-resource management.
2. Emerging issues in cognitive radio network.
3. Different spectrum sharing models.
4. Efficient sharing of the unutilized spectrum among cognitive and licensed users.
5. Interference avoidance at licensed user due to cognitive user's transmission.

Unit	Topics	Lectures
1.	**Introduction to Cognitive Radio:** Spectrum scarcity, Spectrum white space, Fixed spectrum allocation, Software defined radio (SDR), Limitations of SDR, Evolution of cognitive radio, Dynamic spectrum access, Introduction to cognitive radio concept, Cognitive cycle, Functions of cognitive radio; spectrum sensing, spectrum management, spectrum mobility, Cognitive radio architecture, Interference temperature and its models.	8
2.	**Spectrum Sensing and challenges in cognitive radio network:** Hypothesis model for spectrum sensing, Types of spectrum sensing; Non-cooperative sensing, Cooperative sensing, Interference-based sensing, Matched filter detection, Energy detection, Cyclostationary feature detection, advantages and disadvantages of various spectrum	11

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	sensing techniques, False alarm, Miss detection, Optimal sensing framework for infrastructure based cognitive radio network. Research challenges in spectrum sensing, spectrum management and spectrum mobility, potential applications of cognitive radio, IEEE 802.22 for WRANs.	
3.	**Spectrum sharing and management:** Dynamic spectrum Access (DSA): models and architectures, Opportunistic spectrum access (OSA), Antenna Systems, MIMO systems, Smart antenna and beamforming. SDR architecture, Software tunable analog radio components, Reconfigurable digital radio technologies.	**8**
4.	**Cross layer adaptation and security in cognitive radio:** Why we need cross-layer design, adaptation and optimization, Cognitive radio cross layer design, security challenges in cognitive radio. **OFDM for cognitive radio:** OFDM based cognitive radio, Why OFDM is a good fit for Cognitive radio, Challenges to cognitive OFDM systems, Multiband OFDM, A step toward cognitive-OFDM: standards and technologies.	**9**
5.	**Cognitive radio regulation and standardization:** regulatory issues and new spectrum management regimes, spectrum planning, Spectrum authorization, Standards and international activities. **UWB cognitive radio:** Introduction, Fundamentals of impulse radio Ultra Wideband, Cognitive radio requirements versus IR-UWB, Merging impulse radio with cognitive radio.	**6**
	Total Number of Lectures	**42**

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Recommended Reading

1.	Dynamic Spectrum Access and Spectrum Management in Cognitive Radio Networks, Ekram Hossain, Dusit Niyato, and Zhu Han, Cambridge University Press, 2009.
2.	Cognitive Radio Networks, Yang Xiao and Fei Hu, CRC Press.
3.	Cognitive Radio Technology, Bruce Fette, Elsevier, 2006.
4.	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Huseyin Arslan, Springer, 2007.
5.	Essentials of Cognitive Radio, Linda E. Doyle, Cambridge University Press, 2009.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Computational Systems Biology

14B1WBI732

Elective Course

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology and various kind of biological pathways, graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop system level understanding of biological entities for various kind of pathways.

Course Assessment:

T-1 Test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation

CO II: Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering

CO III: Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems

Topics covered:

Introduction to Systems biology and computational systems biology, basic principles of components and systems. top down and bottom up approaches, reductionist and integrative approaches for dealing with biological systems. Gene regulatory network (GRN) analysis, genes, operons, regulons, stimulons. Symbols on gene networks and pathways and their relation with

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

the involved entities. Experimental and computational methods available for GRN. Signal transduction pathways and metabolic pathways, Modeling Complex Biological Systems, and Mass/Flux Balance Analysis. Stoichiometry analysis for component and systems level along with their applications. XML for Bioinformatics and systems biology, includes BioXML, SBML, CellML and their practical applications towards modeling and simulations of biological systems. Incorporation of MathML and CML into standard markup languages for systems biology. Systems Approach to Metabolic Networks and Protien-Protein Interaction Networks, Online tools, databases, and other web based applications for Systems Biology: STRING, BIND, MINT, IPATH, GeneGo, Gypasi, MetaCYC, EcoCyc, RegulonDB, AtPID, JASPAR, TFDB etc. Biocircuits: Blocks and Designing; Various case studies along with their applications E-Cell, virtual cell and other bio-electronic projects.

Text and Reference books

1. Systems Modeling in Cellular Biology
   by Zoltan Szallasi, Joerg Stelling, Vipul Periwal, MIT Press,
2. Systems Biology : Properties of Reconstructed Networks
   by Bernard Palsson, Cambridge Univ. Press
3. Advances in Systems Biology (Advances in Experimental Medicine and Biology).
   Opresko, L., Gephart, J., and Mann, M. (eds.), Plenum US, 2005
4. Artificial Intelligence Methods and Tools For Systems Biology
   Dubitzky, W. and Azuaje, F. (eds.), Kluwer Academic Publisher
5. Metabolome Analyses: Strategies for Systems Biology
   Vaidyanathan, S. et al (eds.), Springer-Verlag
6. Systems Biology in Practice: Concepts, Implementation And Application
   Klipp, E et al., John Wiley & Sons Inc.
7. Foundations of Systems Biology
   Kitano, H.(ed.); The MIT Press
8. Systems Biology
   Alberghina L. and Westerhoff, H.V., eds.; Springer Verlag

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of systems biology combining acquisition, integration and management of experimental data with computer modeling and simulation	H	H	H	H	H	H	M	95
CO-II	Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering	M	H	H	H	H	H	M	90
CO-III	Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems	H	H	H	M	H	H	H	95
	Assessment (%)	89	100	100	89	100	100	78	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Cryptography and Network Security

COURSE CODE: 18B1WCI734

COURSE CREDIT: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Introduction to Computers, Knowledge of Computer Networks

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To know about various encryption techniques.
3. To be able to secure a message over insecure channel by various means.
4. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
5. To understand various protocols for network security to protect against the threats in the networks.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic security services e.g.Authentication, Access Control, Confidentiality, Integrity, and Non repudiation).	Familiarity
CO-2	Learn standard symmetric encryption algorithms	Assessment
CO-3	Learn the architecture for public and private key cryptography and how public key infrastructure (PKI) supports network security.	Assessment
CO-4	Learn the methods of digital signature and encryption.	Assessment
CO-5	Learn key management and how key exchange protocols work.	Usage
CO-6	Learn futuristic cryptographic techniques like Eliptic Curve and quantum cryptography.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Block Symmetric Ciphers** Foundation of Security & Cryptography: OSI security architecture, Security Policy, Classical encryption techniques(Substitution Techniques, Transposition Techniques and Staganography) **Mathematical Tools for Cryptography:** Finite fields, number theory,Design Principle of Block Ciphers:DES, Block Cipher Algorithms: AES,Pseudo Random Numbers & Stream Ciphers: Multiple Encryption, Block Cipher modes of operation,stream ciphers, Confidentiality	2 6
2	**Assyymmetric Ciphers** Public Key Cryptography: RSA, Key management,Hashes & Message Digest:Authentication functions,Message authentication codes,Hash functions and their security,Digital Signature, Certificates & standards,Authentication:X.509 Authentication service,	10
3	**Security Applications and Protocols** Electronic Mail Security:S/MIME, IP and Web Security	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Protocols:IPsec, Secure socket layer and transport layer security, secure e-transaction.	
4	**System Security** System Security : Computer Virus, Firewall & Intrusion Detection , Trusted systems, Security Investigation/Audit, Cyber Laws: IT ACT 2000, IT amendment ACT 2008..	5
Total lectures		**28**

Suggested Text books:

1. "Cryptography & Network Security" by Stallings, William (Seventh Edition or later).

Other useful resources:

1. Virtual Labs: http://cse29-iiith.virtual-labs.ac.in/index.php?section=Experiments Students are advised to practice virtual lab experiments at above link as and when the topics are covered in the class.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Cryptography and Network Security)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	1	3	2	2	1	1	1	1	1	1	1.6
CO-2	3	2	1	2	2	3	1	3	3	1	2	3	2.2
CO-3	2	2	3	1	2	2	3	2	2	3	2	1	2.1
CO-4	2	3	3	3	2	3	2	3	2	1	2	1	2.3
CO-5	3	2	3	1	2	3	3	2	3	1	2	3	2.3
CO-6	3	2	1	1	2	2	2	3	2	1	1	1	1.8
Average	2.7	2.2	2	1.8	2	2.5	2	2.3	2.2	1.3	1.7	1.7	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

[DAMS AND RESERVOIR DESIGN]

COURSE CODE: 10B13CE735

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: [3-0-0]

Pre-requisite: Water Resource Engineering, Geotechnical Engineering

Course Objectives:

1. To introduce the students to the basic knowledge of dams and their appurtenances.
2. To develop an understanding regarding selection of a suitable dam for a particular site.
3. Impart knowledge about the construction, design and maintenance of various dams.
4. Train the students to analyze various dams to check their stability and safety.
5. To apply the principles of water resource and irrigation engineering and excel the students in the computation of the reservoir capacity which is indispensible for deciding the inundation area and demand pattern for any dam.
6. To enable the students to apply their knowledge of mechanics to calculate the critical stresses and various forces(static and dynamic) to ensure the proper design and stability of the dam.
7. To introduce the students to the various modern techniques and various challenges of dam construction by exposing them to real field conditions incorporating modern pedagogical methods of learning.
8. To train the students to use software tools for the modeling and analysis of various dams.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Select the suitable site for construction of different dams and suggest the type of dam required as per the topographical, functional, economical and ecological considerations.	Familiarity
CO-2	Know about the various components of a dam, their functions and types.	Familiarity
CO-3	Calculate the reservoir capacity based on demand (outflow) and supply (inflow) patterns.	Assessment/ Usage
CO-4	Calculate the forces and stresses coming on gravity and earthen dams due to static and dynamic forces prevalent in nature	Assessment
CO-5	Analyze the dam for its safety against various forms of failure and suggest the preventive measures.	Assessment/ Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction and project planning:** Dams and their historical emergence, requirement and types of dams, dam appurtenances. Planning of project, Purpose of development, Project study, Ecological and environmental considerations, Flood studies, Economic consideration, Physical factor governing selection of type, legal, economic, aesthetic considerations, foundation and construction materials. Investigation, Source of information, Surface exploration, sampling, Field and laboratory tests.	12
2	**Reservoir studies:** Types of reservoir, inflow and outflow study into the reservoir, capacity determination by various techniques	6
3	**Concrete gravity dam:** Introduction, Origin and development, Forces acting on dam, Requirements for stability, Dams on pervious foundations	9
4	**Earthfill dams:** Origin , Selection of type, Design principles, Foundation design, Embankments, Embankment details	9
5	**Rockfill dams:** Origin and usage, Definition and types , Foundation design, Embankment design, Membrane design .	6
Total lectures		42

Suggested Text Book(s):

1. S.K. Garg: Irrigation Engineering and Hydraulic Structures, 19th Edition, Khanna Publishers, 2005.
2. W.P.Creager, J.D.Justin and J.Hinds: Engineering for dams, Wiley, 2007.

Suggested Reference Book(s):

1. Trevor Turpin: Dams, First edition, Reaktion Books Publishion, 2008.
2. S.K. Ukarande: Irrigation and Hydraulic structures, Third Edition, Ane Books Pvt. Limited, 2017.
3. I.H. Siddhiqui: Dams and Reservoirs: Planning and Engineering, First Edition, OUP Pakistan, 2008

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	3	1	2	2	2	2	2	2	2.09
CO-2	3	1	3	2	2	3	2	3	2	2	1	2	2.17
CO-3	3	2	3	2	3	2	1	3	1	2	1	2	2.08
CO-4	3	3	3	2	3	3	2	3	3	3	2	2	2.67
CO-5	3	2	2	3	3	3	2	2	3	3	2	2	2.50
Average	3	2	2.8	2	2.8	2.4	1.8	2.6	2.2	2.4	1.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Compression Lab

COURSE CODE: 18B1WCI572
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques" case studies	Familiarity

List of Experiments:

S. No	Description	Hours
1	Implementing a Huffman decoder	2
2	Implementing a Huffman encoder	2
3	Compressing a large file	2
4	Implementation of Run-Length Encoding	2
5	Implementation of RLE Text Compression	2
6	Implementation of RLE Image Compression	2
7	Implementation of Move-toFront Coding	2
8	Implementation of Scalar Quantization	2
9	Implementing Variable-Size Codes	2
10	Implementing Prefix Codes	2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

11	Implementing Golomb Codes	2
12	Implementing The Kraft-MacMillan Inequality	2
13	Implementing The Counting Argument	2
14	Implementing Shannon-Fano Coding	2
Total Lab hours		**28**

Minor Project(s) – (Only for 2 credit lab)

1. Image Compression using Filtering Techniques.
2. Image Decopression using Wavelets transform.
3. Compressing dehazed images using HE, Fattal method
4. Underwater Image compression using Wavelets and equalization
5. Underwater Panoramic Image compression using mosaicking techniques

Suggested Books/Resources:

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006
3. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
4. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
5. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
6. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.
7. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
8. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	3	3	1	2	3	2	3	3	3	3	2	**2.6**
CO-2	2	2	2	3	3	3	2	3	3	3	1	3	**2.5**
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	**3**

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-4	3	3	2	3	3	3	2	1	1	3	3	3	**2.5**
CO-5	3	3	3	1	2	3	2	3	3	3	3	1	**2.5**
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	**2.5**
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Average	**2.7**	**2.7**	**2.6**	**2.4**	**2.7**	**3**	**2.3**	**2.7**	**2.7**	**3**	**2.4**	**2.6**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Data Mining and Data Warehousing

COURSE CODE: 18B1WCI635

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objective:

1. To describe the concept of Data warehouse & its attributes
2. To study different data warehouse models, architectures and implementation
3. To understand the basic concept of data mining and its functionality
4. To understand the concept of classification techniques and its implementation
5. To understand the concept of association rules, different techniques and implementation details
6. To understand the concept of cluster analysis, anomaly detection and its usage and implementation details

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To describe the concept of Data warehouse & its attributes	Assessment
CO-2	To study different data warehouse models, architectures and implementation	Assessment
CO-3	To understand the basic concept of data mining and its functionality	Assessment
CO-4	To understand the concept of classification techniques and its implementation	Assessment
CO-5	To understand the concept of association rules, different techniques and implementation details	Assessment
CO-6	To understand the concept of cluster analysis, anomaly detection and its usage and implementation details	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concepts of Data Warehouse and Data Mining including its functionalities, stages of Knowledge discovery in database(KDD) , Setting up a KDD environment, Issues in Data Warehouse and Data Mining, Application of Data Warehouse and Data Mining	5
2	**Architecture:** DBMS vs. Data Warehouse, Data marts, Metadata, Multidimensional data model, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations, Data Warehouse Architecture, Distributed and Virtual Data Warehouse, Data Warehouse Manager, OLTP, OLAP, MOLAP, HOLAP, types of OLAP, servers	6
3	**Introduction:** Data Mining, Motivation, Challenges, Origins of Data Mining, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity, Exploring Data: Iris Data Set, Summary Statistics,	3

	Visualization, OLAP and Multi dimensional Data Analysis	
4	**Classification:** Basic Concepts and Preliminaries, Approach to Solving a Classification Problem, Decision Tree Induction, Model Over fitting, Evaluating Performance of Classifier **Alternative Techniques**: Rule-Based Classifier, Nearest- Neighbour Classifiers, Artificial Neural Network (ANN), Support Vector Machine (SVM), Ensemble Methods, Class Imbalance Problem, Multiclass Problem	6
5	**Association Analysis:** Basic Concepts and Problem Definition, Frequent Itemset Generation, Rule Generation, Representation of Frequent Itemsets, FP-Growth Algorithm, Evaluation of Association Patterns, Handling Categorical Attributes , Handling Continuous Attributes, Handling a Concept Hierarchy, Sequential Patterns, Subgraph Patterns	6
6	**Cluster Analysis:** Basic Concepts, Characteristics of Data, Clusters, Partitional Clustering, Agglomerative Hierarchical Clustering, Prototype-Based Clustering, Density-Based Clustering, Graph-Based Clustering, Cluster Evaluation **Anomaly Detection:** Preliminaries, Statistical Approaches, Proximity-Based Outlier Detection, Density-Based Outlier Detection, Clustering-Based Techniques	6
Total lectures		**32**

Suggested Text Book(s):

1. Data Mining Concepts and Techniques J. Han and M. Kamber Morgan Kaufmann, 2006, ISBN 1-55860-901-6
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7

Suggested Reference Book(s):

1. Mining Massive data sets Anand Rajaram, Jure Leskovec and Jeff Ullman Cambridge University Press
2. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
3. https://www.coursera.org/specializations/data-mining.
4. https://www.futurelearn.com/courses/data-mining-with-weka

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	1.8

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO 2	3	3	3	3	3	3	2	3	3	1	1	3	**2.6**
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	**2.5**
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	**1.7**
CO 5	3	3	3	3	2	3	1	2	3	2	3	3	**2.6**
CO 6	3	2	1	2	2	1	2	2	2	1	1	2	**1.8**
Average	**3**	**2.3**	**2.2**	**2.3**	**2.2**	**2**	**1.5**	**2.2**	**2.3**	**1.5**	**1.8**	**2.5**	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

10B1WPD731 Entrepreneurship Development

Course Goal

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Course Objectives

After the completion of the course, the students:

- Have the ability to discern distinct entrepreneurial traits
- Know the parameters to assess opportunities and constraints for new business ideas
- Understand the systematic process to select and screen a business idea
- discern the factors that can deem the idea successful and viable
- write a business plan

Detailed Syllabi
Lecture-wise Breakup

Subject Code	10B1WPD731	**Semester**	7
Subject Name	**Entrepreneurship Development**		
Credits	3	**Contact Hours**	42

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction to Entrepreneurship	Role of the entrepreneur in India and around the globe; forces that are driving the growth of entrepreneurship; benefits and drawbacks of entrepreneurship; mistakes of entrepreneurship and how to avoid them; entrepreneurial failure.	5
2.	Overview of business and its functioning	Business and industry; Components of macro and micro business environment	4
3.	Business Idea and Feasibility	Creativity, innovation and entrepreneurship; mental locks" that limit individual creativity; steps in the creative process; techniques for improving the creative process; protection of intellectual property involving patents, trademarks, and copyrights.	4

JUIT, Waknaghat
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

4.	**Strategic Management and Entrepreneur**	Importance of strategic management to a (small) business; understanding competitive advantages; steps in the strategic planning process; basic strategies: low-cost, differentiation, and focus; balanced scorecard in the planning process.	4
5.	**Forms of Business Ownership**	Advantages and the disadvantages of the three major forms of ownership: the sole proprietorship, the partnership, and the corporation. LLP and types of franchising: trade name, product distribution, and pure. Major trends shaping franchising.	4
6.	**Building the business plan :marketing considerations**	Marketing concept and evolution; marketing process; guerilla marketing	4
7.	**Foundations of New Venture Finance**	Understanding capital requirements; identifying the sources of finance; angel investing and venture finance; managing cash flow	5
8.	**Creating the Organization : structure and design**	Forms of organization structure; factors contingent on organizational structure and design	4
9.	**Technical entrepreneur and The E-entrepreneur**	Process of creating and growing high potential ventures; basic approaches to launch an e-commerce effort	4
10.	**Crafting a winning business plan**	Need and importance of business plan; elements of a solid business plan.	4
		Total number of Lectures	42

Recommended Reading	
1.	**Entrepreneurship and New Venture Formation**: Thomas W. Zimmerer, and Norman M. Scarborough. PHI
2.	**Entrepreneurship: Strategies and Resources**, 3/E -: Marc Dollinger; Prentice Hall
3.	**Bringing New Technology to Market**- Kathleen R. Allen, Prentice Hall

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JUIT, Waknaghat

IQAC

4.	**Entrepreneurship in Action**, 2/E - Mary Coulter; Prentice Hall

Methodology & Evaluation	
The course essentially follows an interactive teaching- learning mode; classroom discussions on core concepts, open-forum discussions, use of multi-media cases and guest speakers.	
Evaluation	
T1	15 marks
T2	25 marks
T3	35 marks
TA	25 marks 1. Entrepreneurial solution to present day social problems 2. Video case 3. Spot exercise : Exercise based on segmentation and strategies 4. Group presentation -1 5. Group presentation -2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JUIT, Waknaghat

IQAC

Digital Image Processing

COURSE CODE: 18B1WCI636

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Linear algebra, Matrices, Matrix Operations, Determinants, Systems of Linear Equations, Eigen values, Eigenvectors, Statistics and probability, Programming experience, preferably in matlab, and/or C/C++/C#/Python/Java

Course Objectives:

1. Introduction to various image processing techniques.
2. Learning the basics of Image fundamentals, describing the main characteristics of digital images and how they are represented.
3. Learning of mathematical transforms such as such as Fourier, Cosine transforms, Singular value decomposition.
4. Understanding the concepts of 2D Wavelet transform, image enhancement techniques, Image restoration and denoising, segmentation.
5. Discussing and understanding the concepts of lossy and lossless data compression algorithms, binary and color image processing.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in digital Image Processing.	Familiarity
CO-2	To learn about image transformation techniques and issues related to image transformation.	Assessment
CO-3	To learn the basic techniques for Image Compression	Assessment
CO-4	To learn about enhancing images through techniques like filtering and equalization	Assessment
CO-5	To learn about image restoration, segmentation and denoising.	Assessment
CO-6	To implement graph theory in vector space models and colouring methodologies for images in MATLAB	Usage
CO-7	To understand image processing techniques" case studies	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Digital Image Processing** Introduction to images and its processing, Components of image processing systems, image representations, Image file formats, Applications of digital image processing, image sampling and quantization, Image Analysis, Intensity transformations, contrast stretching, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.	5
2	**Image Transformation Techniques** Need for transform, Fourier, Cosine transforms, Haar, KL Transform, Singular value decomposition, 2D Wavelet transform,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Different properties of image transform techniques.	
3	**Image Compression Basics** Concept of image compression, lossless techniques (Huffman Coding, Arithmetic and Lempel-Ziv Coding, Other Coding Techniques) and lossy compression techniques (Transform Coding & K-L Transforms, Discrete Cosine Transforms, and BTC), Multi-Resolution Analysis, and Still Image Compression Standards (JBIG and JPEG),	8
4	**Image Enhancement** Enhancement in spatial and transform domain, histogram equalization Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphicfiltering,Color image enhancement.	5
5	**Image Restoration and Denoising** Image degradation, Type of image blur, Classification of image restoration techniques, ,image restoration model, Linear and non linear restoration techniques, Image denoising, Median filtering	5
6	**Image Segmentation** Classification of image segmentation techniques, Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region- based segmentation, Watershed algorithm, Use of motion in segmentation	6
Total lectures		**32**

Suggested Text Book(s):

1. Digital Image Processing, R.C. Gonzalez and R.E. Woods, 2nd edition, Pearson Prentice Hall, 2008.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989.

Suggested Reference Book(s):

1. Digital Image processing, S Jayaraman, TMH, 2012
2. William K. Pratt, *Digital Image Processing*, 3rd Edition, John Wiley, 2001.

Other useful resource(s):

1. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_ee40/preview
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/117105079/1
   ii. https://nptel.ac.in/courses/117105079/6
   iii. https://nptel.ac.in/courses/117105079/3
   iv. https://nptel.ac.in/courses/117105079/10
   v. https://nptel.ac.in/courses/117105079/12

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Digital Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	3	2	3	3	3	3	2	2.5
CO-2	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	1	3	3	2.3
CO-5	3	3	3	1	2	3	2	3	3	1	3	2	2.4
CO-6	2	2	2	3	3	3	2	3	3	1	1	3	2.3
CO-7	3	3	3	3	3	3	3	3	3	1	3	3	2.8
Average	2.7	2.7	2.6	2.4	2.6	3	2.3	2.7	2.7	1.9	2.4	2.7	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

DIGITAL SYSTEM DESIGN

(Elective Subject)

Course Code:	12B1WEC732	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. To design digital circuits based on the required application
2. It offers a profound understanding of the design of complex digital circuits and their implementation for real time applications.

Course Outcomes

After studying this course the students would gain enough knowledge

1. To use state machine diagrams to design finite state machines using various types of flip-flops and combinational circuits with prescribed functionality.
2. Design state machines to control complex systems.
3. Define and describe digital design flows for system design and recognize the trade-offs.
4. Understand and design System controllers.
5. The ability to identify and prevent various races and hazards and timing problems in a digital design.
6. Write synthesizable VHDL program.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Digital Design Concepts, Review of digital design fundamentals, minimization and design of combinational circuits, sequential machine fundamentals: the need, concept of memory, Flip flops, sequential machine operations, classifications.	Text Book 1: Chapter 1-5	4
2.	Design of Synchronous Sequential Circuits-Sequential circuits, Finite state model – Basic definition, capabilities and limitation of finite state machines, state equivalence & machine minimization, simplification of incompletely specified machines, Extraction of maximal compatibles, synthesis & analysis of synchronous sequential circuits. Introduction to Multi-Input System controller design: system controllers, frequency and time consideration, MDS diagram generation, CPLD and FPGA	Text Book 1: Chapter 6	12

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	level custom design.		
3	Design of Asynchronous Sequential Circuits - Introduction to asynchronous circuits, timing diagram, state diagram & flow tables, types of asynchronous circuits, fundamental mode circuits, pulse mode circuits, state assignment in asynchronous sequential circuits, Synthesis and analysis, ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, Data path control path partition-based design	Text Book 1: Chapter8	12
4	Hazards and Races - Introduction, gate delays, generation of spikes, production of static hazards in combinational networks, elimination of static hazards, design of hazard free combinational networks, hazard free asynchronous circuit design, dynamic hazards, essential hazards, Races and Cycles.	Text Book 3: Chapter 10	8
5	VHDL/ Verilog HDL - Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches. Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.	Text Book 4: Chapter 1-3	6
		Total Number of Lectures	42

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. John M Yarbrough : Digital Logic Applications and Design, 2nd Edition, Thomson Educaion

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. W. I. Fletcher :An Engineering approach to Digital Design , PHI
3. M.Morris Mano : Digital Design, 3rd edition, Pearson Education, 2007.
4. Michael D. Ciletti: Advanced Digital Design with Verilog HDL, PHI, 2005.

Reference Books

1. Digital Systems Design using VHDL – Charles H Roth, CENGAGE Learning.
2. Switching and Finite Automata Theory by ZVI Kohavi, TMH

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

10B1WPD731 Entrepreneurship Development

Course Goal

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Course Objectives

After the completion of the course, the students:

- Have the ability to discern distinct entrepreneurial traits
- Know the parameters to assess opportunities and constraints for new business ideas
- Understand the systematic process to select and screen a business idea
- discern the factors that can deem the idea successful and viable
- write a business plan

Detailed Syllabi
Lecture-wise Breakup

Subject Code	10B1WPD731	**Semester**	7
Subject Name	**Entrepreneurship Development**		
Credits	3	**Contact Hours**	42

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Introduction to Entrepreneurship	Role of the entrepreneur in India and around the globe; forces that are driving the growth of entrepreneurship; benefits and drawbacks of entrepreneurship; mistakes of entrepreneurship and how to avoid them; entrepreneurial failure.	5
2.	Overview of business and its functioning	Business and industry; Components of macro and micro business environment	4
3.	Business Idea and Feasibility	Creativity, innovation and entrepreneurship; mental locks" that limit individual creativity; steps in the creative process; techniques for improving the creative process; protection of intellectual property involving patents, trademarks, and copyrights.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	**Strategic Management and Entrepreneur**	Importance of strategic management to a (small) business; understanding competitive advantages; steps in the strategic planning process; basic strategies: low-cost, differentiation, and focus; balanced scorecard in the planning process.	4
5.	**Forms of Business Ownership**	Advantages and the disadvantages of the three major forms of ownership: the sole proprietorship, the partnership, and the corporation. LLP and types of franchising: trade name, product distribution, and pure. Major trends shaping franchising.	4
6.	**Building the business plan :marketing considerations**	Marketing concept and evolution; marketing process; guerilla marketing	4
7.	**Foundations of New Venture Finance**	Understanding capital requirements; identifying the sources of finance; angel investing and venture finance; managing cash flow	5
8.	**Creating the Organization : structure and design**	Forms of organization structure; factors contingent on organizational structure and design	4
9.	**Technical entrepreneur and The E-entrepreneur**	Process of creating and growing high potential ventures; basic approaches to launch an e-commerce effort	4
10.	**Crafting a winning business plan**	Need and importance of business plan; elements of a solid business plan.	4
		Total number of Lectures	42

Recommended Reading	
1.	**Entrepreneurship and New Venture Formation**: Thomas W. Zimmerer, and Norman M. Scarborough. PHI
2.	**Entrepreneurship: Strategies and Resources**, 3/E -: Marc Dollinger; Prentice Hall
3.	**Bringing New Technology to Market**- Kathleen R. Allen, Prentice Hall

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JUIT, Waknaghat

IQAC

4.	Entrepreneurship in Action, 2/E - Mary Coulter; Prentice Hall

Methodology & Evaluation	
The course essentially follows an interactive teaching- learning mode; classroom discussions on core concepts, open-forum discussions, use of multi-media cases and guest speakers.	
Evaluation	
T1	15 marks
T2	25 marks
T3	35 marks
TA	25 marks 1. Entrepreneurial solution to present day social problems 2. Video case 3. Spot exercise : Exercise based on segmentation and strategies 4. Group presentation -1 5. Group presentation -2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Foundation for Data Science and Visualization

COURSE CODE: XXXXXXXX COURSE CREDITS: 2 CORE/ELECTIVE: ELECTIVE L-T-P: 2-0-0

Pre-requisite: Basic knowledge of high school mathematics and reasonable programming experience.

Course Objectives:

- Asking the correct questions and analyzing the raw data.
- Modeling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and find the final result.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understanding the basics of data science	Familiarity
CO-2	Using versatile and flexible languages (Python and R programming) for supporting data science	Usage
CO-3	Using data processing for collecting and manipulating the data into the usable and desired form	Usage
CO-4	Using data visualization to easily access the huge amount of data in visuals	Usage
CO-5	Using statistics to collect and analyze the numerical data in a large amount and finding meaningful insights from i	Usage
CO-6	Understanding linear algebra to represent, model, synthesize and summarize the complex data	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Data Science an Introduction:** Computer Science, Data Science, and Real Science, What is Data Science? Need for Data Science, Data Science Components, Tools for Data Science, Data Science Lifecycle, Applications of Data Science	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Python and R Programming for Data Science for Data Science:** Introduction to Python Programming (Python Basics, Python Data Structures, Python Programming Fundamentals, Working with Data in Python, Working with NumPy, Pandas, SciPy, and Matplotlib). Introduction to R Programming (R basics, Data structures in R, R Programming fundamentals, Working with Data in R, Stings, and Dates in R, Discover R's packages to do graphics)	5
3	**Data Processing:** Data Operations, Data cleansing, Processing CSV Data, Processing JSON Data, Processing XLS Data, Relational databases, NoSQL Databases, Date and Time, Data Wrangling, Data Aggregation, Reading HTML Pages, Processing Unstructured Data, Word tokenization, Stemming and Lemmatization	5
4	**Statistical Data Analysis:** Measuring Central Tendency, Measuring Variance, Normal Distribution, Binomial Distribution, Poisson Distribution, Bernoulli Distribution, P-Value, Correlation, Chi-square Test, Linear Regression	5
5	**Linear Algebra:** Visualizing Matrix Operations (Matrix Addition, Matrix Multiplication, Applications of Matrix Multiplication, Identity Matrices and Inversion, Matrix Inversion and Linear Systems, Matrix Rank) Factoring Matrices (Why Factor Feature Matrices, LU Decomposition, and Determinants), Eigenvalues and Eigenvectors (Properties of Eigenvalues, Computing Eigenvalues), Eigenvalue Decomposition (Singular Value Decomposition, Principal Components Analysis)	5
6	**Data Visualization:** Chart Properties, Chart Styling, Box Plots, Heat Maps, Scatter Plots, Bubble Charts, 3D Charts, Time Series, Geographical Data, Graph Data	6
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Data Science from Scratch by Joel Grus
- Data Science for Dummies by Lillian Pierson and Jake Porway
- An Introduction to Statistical Learning by Gareth James, Daniela Witten, et al.

Reference Book(s):

- An Introduction to Probability and Statistics by V.K. Rohatgi & A.K. Md. E.Saleh, Wiley, (2008), 3rd ed.
- Introduction to Probability Theory and Statistical Inference by H.J. Larson, John Wiley & Sons, (2005) 3rd ed.

Other useful resources (s):

- https://nptel.ac.in/courses/110/106/110106064/
- https://onlinecourses.nptel.ac.in/noc18_cs28/pr eview

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Foundation for Data Science and Visualization)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	1	1	1	3	2	2	1	1.8
CO-2	3	3	3	3	3	1	1	2	2	2	1	1	2.1
CO-3	2	2	2	2	1	1	2	2	2	2	1	2	1.8
CO-4	3	3	3	3	2	1	1	3	2	3	3	2	2.4
CO-5	3	2	3	3	1	1	2	1	1	3	2	1	1.9
CO-6	2	2	1	2	2	2	3	2	1	2	3	1	1.9
Average	2.5	2.3	2.3	2.7	1.8	1.2	1.7	1.8	1.8	2.3	2	1.3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

FPGA based Instrumentation System Design

COURSE CODE: 18B1WEC733

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Digital Electronics, Basic

Electronics Course Objectives:

1. Learn and understand the FPGA design flow
2. Learn to implement basic arithmetic circuits and DSP algorithms in FPGA using IP cores.
3. Learn to determine circuit speed, to check timing violations and techniques to fix them.
4. Learn to apply the knowledge gained to break an algorithm into arithmetic functions and implement in FPGA with/without using IP cores.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Explain the concept and basic structures of Field Programmable Gate Array (FPGA), and techniques to implement programmable logic circuits using typical FPGA design flow	Familiarity
CO-2	Implementing basic arithmetic circuits and ASICs for simple DSP functions, such as filters using user defined or vendor provided IP cores	Assessment
CO-3	Determining circuit speed, checking timing violations and techniques to fix the timing violations.	Usage
CO-4	Design issues in cross clock domains communication in high-speed ASIC design	Assessment
CO-5	Break any given algorithm to sub-modules and implement the same on FPGA using HDLs and various IP cores	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to FPGA: From discrete logic to FPGAs, flexibility and functionality, FPGA vs Programmable DSPs, FPGA technology - roadmap, clocking, data and sample rates, slices and configurable logic blocks, memory and registers, performance ratings, families DSP and FPGAs: FPGA elements for DSP algorithms, FPGA-Based System Design Examples	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

2	Verilog HDL: Data types, operators, Multiplexers, decoders, adders, Subtractor, de-multiplexers, flip-flops, counters, state machine, ALU with adder/Subtractor and shifter, multiply and divide hardware synthesis, memory, using a test bench for verification and simulation Concept of state machine and VHDL implementation, simulation synthesis, verification, : FSM Types, Implementation in HDLs, a simple computer design, other Design examples and case studies	12
3	Digital System Design: Combinational and sequential circuits, Classification of sequential circuits, Registers. Design & analysis of synchronous and asynchronous sequential circuits: Counters.	6
4	Embedded Systems & FPGAs: FPGA as a systems on chip platform, FPGA on-chip network standards, FPGAs as custom microcontroller and hybrid DSP microcontroller devices, Multiple cock domains on chip, Multi FPGA systems, multiple-clock domains, program and data memory, SRAM and DRAM., ROM, PAL, and PLA, Timing Constraints, using IP cores: instantiation and simulations	6
5	Instrumentation System: Basic concepts, Weighted Resistor D/A converter, A/D Converter, programmable ICs, digital potentiometers, various data communication and interfacing protocols (UART, SPI, I2C and others) and FPGA implementation case studies	12
Total lectures		42

Suggested Text Book(s):

1. Michael D. Ciletti: Advanced Digital Design with the Verilog HDL, 2nd Edition, Pearson, 2011.
2. Jean- Pierre Deschamps, Gustavo D. Sutter, Enique Cano: Guide to FPGA Implementation of Arithmetic Functions, Springer, 2012.

Suggested Reference Book(s):

1. Hamblen, J.O, Hall, T.S, and Furman, M.D., "Rapid Prototyping of Digital Systems, SOPC Edition." Springer, 2008.
2. Zainalabedin, Navabi, "Digital Design and Implementation with Field Programmable Devices", Springer, 2005.
3. Jean- Pierre Deschamps, Gery Jean Antoine Bioul, Gustavo D. Sutter, "Synthesis of Arithmetic Circuits-FPGA ASIC and Embedded Systems" , a John Wiley & sons, inc, publication, 2006.

Other useful resource(s):

1. FPGA manufacturer's web resources:

   Altera Inc.: https://www.altera.com/products/general/fpga/stratix-fpgas/about/stx-asic-prototyping.html

   Xilinx: https://www.xilinx.com/applications/asic-prototyping.html

2. **Other Journal/research resources:**

   http://biomedical-engineering-online.biomedcentral.com/articles/10.1186/1475-925X-13-126

   http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.470.6049&rep=rep1&type=pdf

3. NPTEL Resources

   https://nptel.ac.in/courses/117108040/

   https://nptel.ac.in/courses/117106092/55

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

https://nptel.ac.in/syllabus/117108040/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (FPGA based Instrumentation System Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	2	x	1	3	3	1	2	1.67
CO-2	3	2	3	1	2	2	x	x	3	1	1	2	1.67
CO-3	3	3	3	2	3	2	x	x	3	2	1	2	2.00
CO-4	3	3	3	2	3	2	x	x	3	2	1	2	2.00
CO-5	3	3	3	3	3	2	x	x	3	2	1	2	2.08
Average	3	2.6	3	1.8	2.6	2	0	0	3	1.6	1	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

From Graph to Knowledge Graph

COURSE CODE: XXX **COURSE CREDITS:** 2 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 2-0-0
Pre-requisite: Basic programming skills

Course Objectives:

1. You will learn graph representations.
2. Understand the entire process of how to design, construct, and query a knowledge graph to solve real-world problems.
3. Understand how to apply the tools and infrastructure to build and query knowledge graphs.
4. Use knowledge graphs in modern search applications.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Learn graph representations	Familiarity
CO-2	Utilize fundamentals to build knowledge graphs	Assessment
CO-3	Understand the algorithms and techniques for crawling web sites, structured data extraction, and information extraction from unstructured text.	Assessment
CO-4	Understand how to apply the tools and infrastructure to build and query knowledge graphs.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	Introduction and Overview Introduction to Graphs, Introduction to Knowledge graphs	4
2	Graph Properties and Applications: Graph basics, Graph Applications	4
3	Graph Representation Learning Embeddings and Graph Embeddings	4
4	Knowledge Graph (KG) - Fundamentals and Construction. KG Fundamentals How to Build a Knowledge Graph	5
5	Knowledge Graph (KG) - Inference and Applications KG Inference. How to Use a Knowledge Graph Why We Need Knowledge Graphs: Applications KG Applications	6
6	Knowledge graph analytics	5
	Total Lecture Hours	28

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

- Fensel, Dieter (et al.), "Knowledge Graphs Methodology, Tools and Selected Use Cases", Springer, 2020.
- Qi, G. et. al, "Knowledge Graph", Springer, 2020, ISBN 978-981-10-8177-4

Suggested Reference Book(s):

- Jeff Z. Pan, Guido Vetere, Jose Manuel Gomez-Perez, Honghan Wu, " Exploiting Linked Data and Knowledge Graphs in Large Organisations", Springer International Publishing. Print ISBN 978-3-319-45652-2. DOI https://doi.org/10.1007/978-3-319- 45654-6
- Mayank Kejriwal, "Domain-Specific Knowledge Graph Construction", Springer, DOI: 10.1007/978-3-030-12375-8

Other useful resources (s):

- Journal, "Knowledge-Based Systems", Springer

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (From Graph to Knowledge Graph)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

FUNDAMENTALS OF DIGITAL IMAGE PROCESSING

(Elective Subject)

Course Code:	10B1WEC734	Semester:	7th Semester, B.Tech. (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement).
3. Design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation).
4. Assess the performance of image processing algorithms and systems.

Course Outcomes

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to

1. Analyze general terminology of digital image processing.
2. Examine various types of images, intensity transformations and spatial filtering.
3. Develop Fourier transform for image processing in frequency domain.
4. Evaluate the methodologies for image segmentation, restoration etc.
5. Implement image process and analysis algorithms.
6. Apply image processing algorithms in practical applications.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Digital Image Fundamentals: Fundamental steps in DIP, Components of digital image processing, elements of visual perception, Structure of the human eye, Image formation in the eye, Brightness adaptation and discrimination, light, Image sensing and acquisition, image formation model, definition and some properties of two dimensional system, Discrete 2D convolution, 2D discrete Fourier transform and its properties, optical and modulation transfer function, Spectral density function. Sampling and quantization of images, Two dimensional sampling theory, representation of digital image, Spatial and gray level resolution, zooming and shrinking, some basic relationships between pixels.	Gonzalez and Woods Chapter – 1 Pg. 1-29 Chapter – 2 Pg. 34-70 Chapter – 4 Pg. 149-166	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

2.	Image Enhancement in the Spatial Domain: Gray Level Transformations, Piecewise linear transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters, Use of first order and second order derivative in enhancement.	Gonzalez and Woods Chapter – 3 Pg. 76-130	7
3.	Image Enhancement in the Frequency Domain: Two dimensional Fourier Transform, properties of frequency domain, correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	Gonzalez and Woods Chapter – 4 Pg. 148-193	7
4.	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	Gonzalez and Woods Chapter – 5 Pg. 221 - 261	7
5.	Image Compression: Fundamentals of Image Compression, Image compression models, concepts of Information Theory, Fundamental coding theorems, Estimation of entropy, Variable length coding, Huffman coding, Near optimal variable length coding, Near optimal variable length coding, Arithmetic coding, constant area coding, run length coding, image compression standards (JPEG, JPEG2000).	Gonzalez and Woods Chapter – 8 Pg. 411- 456	7
6.	Image Segmentation: Detection of Discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation, region growing, splitting and merging.	Gonzalez and Woods Chapter-10 Pg. 568-615	6
		Total Number of Lectures	**41**

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Text Books

1. R.C.Gonzalas and R.E.Woods, Digital Image Processing, Prentice Hall, 3rd Ed.

Reference Books

1. A.K.Jain, Fundamentals of Digital Image Processing, Prentice Hall.
2. S.Sridhar, Digital Image Processing, Oxford University Press.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

Fundamentals of Digital Image Processing and Applications

COURSE CODE: 20B1WEC533

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

: 3-0-0

Pre-requisite:

Course Objectives:

1. **Describe and explain basic principles of digital imageprocessing.**
2. Design and implement algorithms that perform basic image processing.
3. Design and implement algorithms for advanced image analysis.
4. Assess the performance of image processing algorithms andsystems.

Course Outcomes

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to

S. No.	Course Outcomes	Level of Attainment
CO-1	Analyze general terminology of digital image processing.	Familiarity
CO-2	Examine various types of images, intensity transformations and spatial filtering.	Usage
CO-3	Evaluate the methodologies for image segmentation, restoration etc.	Usage
CO-4	Understand different types of medical imaging modalities and would be able to differentiate them with respect to their advantages and limitations.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Digital Image Fundamentals: Fundamental steps in DIP, Components of digital image processing, elements of visual perception, Structure of the human eye, Image formation in the eye, Brightness adaptation and discrimination, light, Image sensing and acquisition, image formation model, definition and some properties of two dimensional system, Discrete 2D convolution, 2D discrete Fourier transform and its properties, optical and modulation transfer function, Spectral density function. Sampling and quantization of images, Two dimensional sampling theory, representation of digital image, Spatial and gray level resolution, zooming and shrinking, some basic relationships between pixels.	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	Image Enhancement in the Spatial Domain: Gray Level Transformations, Piecewise linear transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters, Use of first order and second order derivative in enhancement.	7
3	Image Enhancement in the Frequency Domain: Two dimensional Fourier Transform, properties of frequency domain, correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	7
4	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	7
5	Image Segmentation: Detection of Discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation, region growing, splitting and merging.	7
6	Application of Image Processing In Medical Field: Working principle, applications and limitations of different medical imaging modalities. Types of texture parameters: Statistical analysis of texture (First order statistics and Second order statistics), Grey level co-occurrence matrix, grey-level run length matrix.	7
Total lectures		42

Text Books

1. R.C.Gonzalas and R.E.Woods, Digital Image Processing, Prentice Hall, 3rd Ed.
2. Rangaraj M. Rangayyan: Biomedical Image Analysis, 1st Ed., CRC Press, New York ,2004.

Reference Books

1. A.K.Jain, Fundamentals of Digital Image Processing, PrenticeHall.
2. S.Sridhar, Digital Image Processing, Oxford UniversityPress.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Fundamentals of Digital Image Processing & Applications)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	2	3	1	2	1	2	2.42
CO-2	3	3	3	3	2	0	0	1	2	3	1	1	1.83
CO-3	3	3	3	3	3	1	1	1	1	2	1	1	1.92
CO-4	3	3	3	3	3	3	2	3	2	2	3	3	2.75
Average	3.00	3.00	3.00	3.00	2.75	1.75	1.25	2.00	1.50	2.25	1.50	1.75	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

EMBEDDED SYSTEM DESIGN

(Elective for B Tech)

Course Code:	14B1WEC735	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

1. To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
2. To provide experience to integrate hardware and software for microcontroller applications systems.

Course Outcomes

To acquire knowledge about microcontrollers embedded processors and their applications.

1. Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Foster ability to write the programs for microcontroller.
3. Foster ability to understand the role of embedded systems in industry.
4. Foster ability to understand the design concept of embedded systems.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to embedded systems: Introduction to embedded systems, Difference between Embedded and General-Purpose Computing. Embedded microcontrollers and their architectures. Embedded system components.	Text Book #1 Chapter No. 1 Chapter No. 2	4
2.	8051 Microcontroller: 8051 Architecture, Pin configuration, Reset and system clock, timers and interrupts, Special function registers, Program/ data memory, addressing modes. Introduction to 8051 assembly language programming, Arithmetic instructions, Logic and Compare instructions, Branch and conditional instructions, Single bit instruction programming.	Text Book # 2 Chapter No. 2 Chapter No. 3 -8	9
3	8051 Interrupts: Introduction to 8051 interrupts, programming of timer interrupts, programming external hardware interrupts, programming the serial communication interrupts, interrupt priority in the 8051.	Text Book # 2 Chapter No. 9 Chapter No. 11	4
4	Serial Communication: Basics of serial communication, 8051 connection to RS 232, 8051 serial communications Programming.	Text Book # 2 Chapter No. 10	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Real World Interfacing: Interfacing of A/D and D/A converter, interfacing stepper motor, interfacing of LCD, interfacing of sensors, interfacing keyboard.	Text Book # 2 Chapter No. 12	5
6	PIC18F Family: The Architecture of PIC family of devices, PIC18F instructions and assembly language, PIC18F programming model, instruction set, instruction format. Data copy, arithmetic, branch, logical, bit manipulation and multiply divide operations. Stacks, subroutines and macros.	Text Book # 3 Chapter No. 3-7	8
7	Interrupts and Timers of PIC: Concepts of Interrupts and Timers. Interrupts and their implementation in PIC18. The PIC18 timers. The CCP. Use of Interrupts in applications.	Text Book # 3 Chapter No. 10 Chapter No. 12	5
8	I/O Port and Interfacing: Concepts of I/O interfacing and PIC18 I/O ports. Interfacing output and input peripherals.	Text Book # 3 Chapter No. 13 Chapter No. 14	4
		Total Number of Lectures	**42**

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. Embedded systems design by Steve Heath, Newnes.
2. The 8051 Microcontroller and embedded systems by Muhammad Ali Mazidi, PHI.
3. PIC microcontroller and embedded systems by Muhammad Ali Mazidi, PHI.

Reference Books

1. The 8051 microcontroller by Kenneth J. Ayala, Cengage Learning.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Human Rights for Technocrats

COURSE CODE: 18B1WHS641

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Conceptual background of human rights and duties:** Definitions and classifications	2
2	**Meaning and Significance of Human Rights :** Scope of the Human Rights	2

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

3	**Relationship between Rights and Duties:** Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	**Universal Declaration of Human Rights: Technical background :** Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5
5	**History of human rights civilization:** Brief history of human Rights, The Spread of Human Rights, Middle Ages, Modern human rights	5
6	**Human rights movements :** Anti-colonialism, World War II and the United Nations, Global human rights struggles, Changes in the 1970s Since the 1990s	8
7	**Enforcement and protection mechanism of human rights in India :** Judiciary, National Human Rights Commission and other Commissions and Committees , Non-governmental organizations, Information Media, Education	5
8	**Development, international trade and human rights:** Right to development: Issues of international equity and justice, equitable access to benefits of science and technology, Freedom of international trade, most-favoured nation treatment (equality of treatment) versus special treatment of the developing countries, access to international markets, equitable pricing of raw material	5
9	**Human rights, science and technology:** Overview,violation of human rights by technology	3
10	**Human rights of the working class:** Labour welfare legislation in India, Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	4
Total lectures		42

Suggested Text Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Suggested Reference Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Other useful resource(s):

1. https://www.google.com/search?q=Meaning+and+Significance+of+Human+Rights&rlz=1C1GCEU_enBIN820IN820&oq=Meaning+and+Significance+of+Human+Rights&aqs=chrome..69i57j0l5.1710j0j7&sourceid=chrome&ie=UTF-8
2. https://www.equalityhumanrights.com/en/human-rights/what-are-human-rights

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Presentation (1)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Human Rights for Technocrats)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75
CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Introduction to Machine Learning

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

None

Course

Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods, and classification methods.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Gain knowledge about basic concepts of Machine Learning	Familiarity
CO-2	Understand complexity of Machine Learning algorithms and their limitations	Familiarity
CO-3	Solve the problems using various machine learning techniques	Usage
CO-4	Design application using machine learning techniques	Assessment
CO-5	Capable of performing experiments in Machine Learning using real-world data.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Overview of intelligent systems and machine learning, Supervised learning, Unsupervised learning, Reinforcement learning, Bias-variance trade-off, Overfitting, Underfitting, Goals and applications of machine learning	5
2	Linear Regression with One Variable: Model representation, Cost function, Gradient descent, Gradient descent for linear regression	4
3	Linear Algebra: Matrices and vectors, Addition and scalar multiplication, Matrix vector multiplication, Matrix-matrix multiplication, Matrix multiplication properties, Inverse and transpose, Multivariable calculus, and Modern applications	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4	Linear Regression with Multiple Variables: Multiple features, Gradient descent for multiple variables, Feature scaling, Learning rate, Features and polynomial Regression, Normal equation, Noninvertibility	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Logistic Regression: Classification, Hypothesis representation, Decision boundary, Cost function, Simplified cost function and Gradient descent, Advanced optimization, Multiclass classification: One-vs-all	6
6	Bayesian Learning: Probability theory and Bayes rule, Naive Bayes learning algorithm, Parameter smoothing, Generative vs. discriminative training, Bayes nets and Markov nets for representing dependencies.	6
7	Regularization: The Problem of overfitting, Cost function, Regularized linear regression, Regularized logistic regression	4
8	K-Nearest Neighbours: Introduction, KNN algorithm, Parameter selection , KNN as Classifier, KNN as Regressor, Applications	4
9	Machine Learning System Design: Error analysis, Error metrics for skewed classes, Trading off precision and recall, Data for Machine Learning	4
Total lectures		42

Suggested Text Book(s):

1. C. Bishop: Pattern Recognition and Machine learning, Springer, 2006.
2. H. Daume: A course in Machine leaning, 2015.
3. Ethem Alpaydin, "Introduction to Machine Learning", Second Edition, The MIT Press, Cambridge, 2010.

uggested Reference Book(s):

1 T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2013.

2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC, 2014.

Other useful resource(s):

1. Link to NPTEL course contents: Introduction to Machine Learning https://onlinecourses.nptel.ac.in/noc17_cs26/preview
2. Link to MITOPENCOURESEWARE: Machine Learning https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO (Introduction to Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	3	2	2	2	2	2	1	1	2	3	3	2.17
CO2	3	3	3	2	3	2	2	1	1	2	3	3	2.33
CO3	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO4	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO5	3	3	3	3	3	3	3	1	3	3	3	3	2.83
Average	3.00	3.00	2.80	2.60	2.80	2.60	2.60	1.00	2.20	2.60	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Machine Learning and Data Analytics–I

COURSE CODE:18B1WEC733

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

5. To provide a broad survey of approaches and techniques in machine learning;
6. To develop the basic skills necessary to pursue research in machine learning.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic theory underlying machine learning.	Familiarity
CO-2	Apply machine learning algorithms to solve problems of moderate complexity.	Assessment
CO-3	Formulate machine learning problems corresponding to different applications.	Assessment
CO-4	Understand a range of machine learning algorithms along with their strengths and weaknesses.	Usage
CO-5	Read current research papers and understand the issues raised by current research.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Fixed, Adaptive and Intelligent systems; Adaptive techniques: Prediction, Classification, Forecasting, Filtering, Direct and Inverse modeling.	5
2	**Data Exploration and Pre-processing:** Data objects and attributes; Statistical measures, Visualization, Data cleaning and integration	5
3	**Dimensionality Reduction:** Discriminant analysis; Principal component analysis, Independent component analysis; Transform Domain and statistical feature extraction and reduction.	4
4	**Regression:** Linear regression, Multivariate regression, Logistic regression; Support vector machine.	6
5	**Clustering:** K-Means, Hierarchical and Density based clustering.	7
6	**Decision Tree based Learning:** Decision tree induction, Attribute selection and tree pruning.	4
7	**Artificial Neural Networks:** Single layer neural network, Multilayer Perceptron, Back Propagation learning, Functional link artificial neural network, Radial basis function network, Recurrent neural	11

IQAC

	networks, Convolution neural network.	
Total lectures		**42**

Suggested Text Book(s):

6. C. M. Bishop: Pattern Recognition and Machine learning, Springer, 1st Edition, 2006.
7. J. Han, M. Kamber, J. Pei: Data Mining: Concepts and Techniques, Elsevier Amsterdam, 3rd Edition, 2011

Suggested Reference Book(s):

6. T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2nd Edition, 2013.
7. H. Simon: Neural Networks and Learning Machines, Prentice Hall, 3rd Edition, 2009.

Other useful resource(s):

1. H. Daume: A course in Machine learning, 2015.
http://ciml.info/
2. Link to NPTEL course contents:Introduction to Machine Learning
https://onlinecourses.nptel.ac.in/noc17_cs26/preview
3. Link to MITOPENCOURESEWARE: Machine Learning
https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (3) - 10 Quizzes(3) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
SOLAN (H.P.)

NAME OF DEPARTMENT: **Electronics and Communication Engineering**

1. Subject Code: **18B1WEC734** Course Title: **MEDICAL IMAGE PROCESSING (Elective Course)**

2. Contact Hours: **L: 3** **T: 0** **P: 0**

3. Credits: **3** **4.** Semester **7th Semester, B.Tech.(ECE)**

5. Course Objectives

Introducing various medical imaging modalities and understanding the requirement and development of different block computer aided diagnosis (CAD) for medical images.

6. Course Outcomes

Students will be able to

Course Outcomes (18B1WEC734: MEDICAL IMAGE PROCESSING)		Level of Attainment
CO-1	Able to understand different types of medical imaging modalities and would be able to differentiate them with respect to their advantages and limitations.	Familiarity
CO-2	Acquire an ability to analyze and process medical images.	Usage
CO-3	Understand different feature extraction techniques and classifiers used for image classification.	Usage
CO-4	Understand the role of computer aided diagnosis (CAD) for medical images.	Assessment

7. Course Contents

S. No.	Contents	Contact Hours
1.	Image formation & representation – Image formation; Sampling and quantization; binary image; 3-D imaging; image file formats. Image enhancement & restoration: Spatial and histogram based enhancement; Noise modeling, Image restoration. Image transformation – Fourier transforms (1D, 2D, DFT, Matrix form representation, FFT).	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2.	Edge Detection: Gradient based edge detection (Robert's operator, Sobel operator, Prewitt operator, Laplacian operator); Canny edge detector. Image Segmentation: Intensity thresholding based image segmentation; Region growing and region splitting algorithm; watershed segmentation.	8
3.	Working principle, application and limitation of Computed tomography (CT), X-ray, Magnetic resonance imaging (MRI) , Ultrasound (US) imaging, and Positron emission tomography (PET). Computer aided diagnosis (CAD): Flowchart and its requirement.	6
4.	Image Texture: Definition and its importance in CAD, Texture in biomedical images. Types of texture parameters: Statistical analysis of texture (First order statistics and Second order statistics), Grey level co-occurrence matrix (GLCM), grey-level run length matrix (GLRLM).	8
5.	Pattern classification: Supervised pattern classification, and Unsupervised pattern classification. Neural Network (NN): Single layer perceptron, learning rate, Activation functions, single layer NN, Deep NN (with large number of hidden layers), Measures of diagnostic accuracy, Reliability of features classifiers and decisions. Introduction to Support Vector Machine (SVM).	6
6.	CAD for diagnosing Liver ultrasound (US) images; Pre-processing , Segmentation, Feature extraction, and Classification of liver US images.	6
	Total	**42**

8. Evaluation Scheme

Test 1 : 15 marks (1 Hour)
Test 2 : 25 marks (1.5 Hours)
Test 3 : 35 marks (2 Hours)
Internal Assessment: 25 marks

- Class performance, Tutorials & Assignments : 10 marks
- Quizzes : 10 marks
- Attendance : 5 marks

Total : 100 marks

9. Text Books

S. No.	Name of Books/Authors	Year of Publication
1.	Rangaraj M. Rangayyan, "Biomedical Image Analysis", 1st Ed., CRC Press, New York.	2004
2	Chris Solomon, Toby Breckon:, "Fundamental of Digital Image Processing", 1st Ed., John Wiley & Sons.	2011

10. Reference Books

S. No	Name of Books/Authors	Year of Publication

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

1.	RC Gonzalez, RE Woods, "Digital Image Processing", 3rd Ed., Pearson Publisher.	2008
2.	Kayvan Najarian, Robert Splinter, "Biomedical Signal and Image Processing" 2nd Ed., CRC Press.	2012
3	Tamal Bose, "Digital Signal and Image Processing", 1st Ed., John Wiley & Sons.	2003

11. Web Resources

1	**NPTEL ONLINE COURSES** Digital Image Processing	http://www.nptelvideos.in/2012/12/digital-image-processing.html (Prof P.K. Biswas, IIT Kharagpur)

CMOS ANALOG CIRCUIT DESIGN

(Elective Subject)

Course Code:	13B1WEC731	**Semester:**	7th Semester, B. Tech (ECE)
Credits:	3	**Contact Hours:**	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. Differential Amplifier
2. Operational amplifier
3. Applications of operational amplifier
4. High gain amplifier architecture
5. Two stage CMOS operational amplifier

Course Outcomes

After studying this course the students would gain enough knowledge

1. To be aware about the designing of differential amplifier
2. configurations, equivalent circuit, parameters of an operational amplifier
3. regarding various applications of op-amp and compensation technique.
4. what are current amplifiers, output amplifiers and difference between voltage and current amplifiers
5. design of two stage CMOS operational amplifier and its applications.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Microbial Ecology

COURSE CODE

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Microbial populations diverse habitat and application

Course Objectives:

1. The course focus is on the structure and function of microbial communities, and current methods in microbial ecology.
2. The following subjects are studied: function and regulation of microbial productivity and metabolism; the importance of microbial processes for the turnover of nutrients and organic carbon; microbial interactions and co-evolution; molecular methods for species identification and quantification of microorganisms; biogeography, succession, and selection of bacteria.

Course Outcomes

Sr. No.	Course outcomes	Level Attainment
CO I	To understand basic concepts, history and overview of microbial ecology	Familiarity
CO II	To interpret the various ecological and evolutionary principles that impact microbes	Familiarity
CO III	To familiarize with experimental approaches used in the field of microbial ecology.	Assessment
CO IV	To understand basic methods and techniquesused in microbial ecology.	Usage
CO V	To gain knowledge about a specific aspect of the microbial ecology.	Usage
CO VI	To understand the applications of microbes growing in extreme environment for welfare of mankind	

Topic Covered

S. No.	Contents	Hrs
1	**Introduction to microbial ecology** **Introduction:** History, overview, definitions, terminology, concepts and applications	2
2	**Classification of microbial populations** **Physiological diversity of microorganisms**: prokaryotic diversity; eukaryotic microorganism; Microbial taxonomy, Phylogeny of *Archea*; **Extremophils:** commercial uses of extremophils; microbial diversity and its application in modern science	6
3	**Role of microorganism in ecosystem** **Individuals and populations**: productivity, growth, distribution, Ecology of macro- and microorganisms: Microbial functions in ecosystems and global cycles, Communities: colonization, succession, diversity, structure	8

Approved in Academic Council Meeting held on 28 July, 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4	**Methods in microbial ecology** **Methods**: Culture-based methods, biomarkers, cell stains, Characterization of microbial communities using PCR, real-time PCR, molecular fingerprints, FISH, sequencing, pyro-sequencing techniques		6
5	**Microbial interactions** **Interactions of microbes with environment**: Microbial guilds and biogeochemical cycles, **Interactions with the biotic environment**: symbiosis, competition, parasitism, predation. **Interactions within microbial communities**: Quorum sensing, syntrophy, antibiotics, Interactions of microorganisms with algae and plants, Interactions of microorganisms with animals and humans		8
6	**Microorganisms in Ecosystems** **Marine ecosystems**: deep-sea, methane seeps, anoxic basins, **Freshwater ecosystems**: lakes, rivers, swamps, bogs ocean surface, tidal flats, estuaries **Terrestrial ecosystems**: rocks and soil, prairie, forest, tundra ,		6
7.	**Applications of microbes in maintaining ecosystem**	**Extreme environments**: Deserts, hot springs, mine drainage, glaciers, deep subsurface, Landfills, **Microbial bioremediation:** wastewater treatment reactors, bioleaching, biodegradation, biomining, **Evolving communities:** evolutionary ecology and community stability	6
		Total Number of Lectures	**42**

REFERENCE & TEXT BOOKS

1. Microbial Diversity, D. Colwd
2. Microbial Ecology : Fundamentals and Applications 4th Edition
3. Microbial Ecology, Atlas and Bartha.
4. Microbial Ecology, J.M.Lynch and N. J. Poole
5. Microbial Ecology in Sustainable Agroecosystems (English, Hardcover, Diana H. Wall, Tanya Cheeke, Coleman David C. Prof.)
6. Human Microbial Ecology; Michael J. Hill (Author), Philip D. Marsh (Author)

Evaluation Scheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Entire Syllabus
Teacher Assessment	25	Entire Sem	Based on Assignments, quizzes etc.

Approved in Academic Council Meeting held on 28 July, 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

MOBILE COMMUNICATION

(Elective Subject)

Course Code:	10B1WEC731	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0,P-0

Course Objectives

1. To make students familier with fundamentals of mobile communication systems
2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems
5. As a prerequisite for the course in Wireless LANs

Course Outcomes

1. To make students familiar with various generations of mobile communications
2. To understand the concept of cellular communication
3. To understand the basics of wireless communication
4. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
5. Knowledge of IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations.
6. Knowledge of 3G mobile standards and their comparison with 2G technologies.
7. To under multicarrier communication systems.
8. To differentiate various Wireless LANs.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Evolution of mobile communication systems. 1G, 2G, 2.5G & 3G systems. IMT2000, FDD, TDD, FDMA, TDMA, CDMA, SDMA. Radio frequency spectrum and communication technology. Block diagram of mobile communication system. Problems of mobile communication: spectrum, propagation. Near far problem.	T S Rapaport: Pages 1-39, Jochen Schiller: Pages 7-15	4
2.	The cellular Concept – Introduction, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trucking and grade of services, Improving coverage & capacity in cellular system	T S Rapaport: Pages 57-93	6
3.	GSM standards and architecture, GSM Radio aspects, typical call flow sequences in GSM, security aspects. GPRS	Jochen Schiller: Pages 96- 120 Raymond Steel: 65-147	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

4.	CDMA standards: Spread spectrum, direct sequence and frequency hop spread spectrum, IS-95 CDMA architecture, forward link and reverse link,cdma2000	Raymond Steel: 205-281 T S Rapaport: Pages 569- 582	8
5.	WCDMA: Frame structure, UTRA FDD, UTRA TDD, UMTS, architecture	Jochen Schiller: 136-155	4
6.	Introduction to WLAN: Infrastructure based and adhoc networks, IEEE 802.11, IEEE 802.11a, IEEE 802.11b. Bluetooth, WiMAX	Jochen Schiller: 201-238, 269-290	8
7.	4G Systems: Introduction to OFDM and MC-CDMA	L. Hanzo, T. Keller: 1-18, 203-217	6
		Total Number of Lectures	**44**

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1) T. S. Rappaport, Wireless Communications, PHI, 2002.

2) Mobile Communication, Jochen Schiller, Pearson.

Reference Books

1) WilliamC.Y.Lee,MobileCellularTelecommunications-Analog&DigitalSystems, Mc.Graw Hill,1995

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Network Analysis and Synthesis

COURSE CODE: 18B1WEC534

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Circuit analysis in the S domain using Laplace transforms. Analysis of two port networks.
2. Design and analysis of filters and attenuators. Elements of realizability and synthesis of one port networks.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the need and foundation of network analysis	Familiarity
CO-2	Analyze two port networks, filters and attenuators	Assessment
CO-3	Analysis of problem solving, knowledge and reasoning	Assessment
CO-4	Study of application domains for network analysis and synthesis.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Laplace transform and its application in circuit analysis : Laplace Transformation, laplace transforms of some important functions, properties of laplace transforms, step function, impulse function, laplace transform of periodic functions, inverse transforms, initial and final value theorms. Circuit elements in the S domain, Transfer function, use of transfer function in circuit analysis, the transfer function and the convolution integral, the transfer function and the steady state sinusoidal response, the impulse function in circuit analysis.	8
2	S- Domain Analysis: Concept of complex frequency, physical interpretation of complex frequency, transform impedance and transform circuits, series and parallel combinations of elements, terminal pair or ports, network function for one port and two port networks, poles and zeros of network functions, significance of poles and zeros, properties of driving point functions, properties of transfer functions, necessary condition for a driving point function, necessary condition for transfer functions, time domain response from pole zero plot, amplitude and phase response from pole zero plot, stability criteria for an active network, routh criteria.	9
3	Two- Port networks: Two port networks, open circuit (Z) parameters, short circuit (Y) parameters, transmission (ABCD) parameters, inverse transmission (A' B'C'D')parameters, Hybrid (H) parameters, Inverse Hybrid(G) parameters, inter relationships of different parameters, interconnection of two port networks, T and ∏ representations, terminated two port network, lattice network, Image networks.	8
4	Filters and Attenuators: Classification of filters, filter networks, equation of filter networks, classification of pass band and stop band, characteristic impedance in the pass band and stop bands, constant –K low pass filter, constant –K high pass filter, m derived T- section, band pass filter, band elimination filter, attenuators, T- type attenuator, ∏- type attenuator, lattice attenuator, bridged –T attenuator, L- type attenuator, equalizers, inverse network, series equalizer, full series equalizer, shunt equalizer, full shunt equalizer, constant – resistance equalizer, bridged –T attenuation equalizer, bridged –T phase equalizer, lattice attenuation equalizer, lattice phase equalizer.	9
5	Elements of realizability and synthesis of one port networks : Hurwitz polynomials, positive real functions, frequency response of reactive one ports, synthesis of reactive one ports by foster's method, synthesis of reactive one ports by Cauer's method, synthesis of R-L network by foster's method, synthesis of R-L network by Cauer's method, synthesis of R-C network by foster's method, synthesis of R-C network by Cauer's method.	8
	Total lectures	42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

1. A sudhakar, shyammohan S palli" Circuits and networks Analysis and synthesis", Fifth Edition, Tata Mcgraw Hill.
2. M E Van Vakenburg,"Network Analysis and synthesis", Third edition, Pearson

Suggested Reference Book(s):

1. Ravish R Singh, "Network Analysis and synthesis", Tata McgrawHill.

Other useful resource(s):

Link to topics related to course: https://nptel.ac.in/courses/106105154

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Network Analysis and Synthesis)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	3	1	1	1	2	2	2	2	2.08
CO-2	2	3	2	3	2	1	1	1	2	2	1	2	1.83
CO-3	2	3	3	2	2	1	1	1	2	2	1	2	1.83
CO-4	2	3	3	3	2	1	1	1	2	3	1	2	2.00
Average	2.25	2.75	2.75	2.75	2.25	1	1	1	2	2.25	1.25	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Peptide Therapeutics

COURSE CODE: 18B1WBT631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: General Chemistry

Course Objectives:

1. To develop an understanding of important concepts and design aspects of peptides
2. To learn various therapeutic applications of peptides.
3. Apply basic knowledge to design peptides for various therapeutic purposes

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand various peptide design consideration and other important structural aspects of peptides	Familiarity
CO-2	Able to understand and learn the concept of solid phase peptides synthesis	Familiarity
CO-3	To develop methods of peptides and proteins for their quality control and apply them in handling Therapeutic peptides and proteins	Assessment
CO-4	To understand the mechanism of action of Antibiotic, Anticancer, Antihypertensive and Opioid peptides	Usage
CO-5	To develop a strong foundation therapeutic peptide design and their applications	Usage

Course Contents:

Unit	Contents	Lectures required
1	Peptides, synthetic peptides & their classification based on structure, engineering bioactive peptide based therapeutic molecules,	7
2	Principle and practice of solid phase peptide synthesis, solid support, protection scheme, peptide acid and amide, Purification of peptides, quality control of peptides	7
3	Antimicrobial host defense peptides, Anticancer peptides, Opioid Peptides, Antihypertensive Peptides, Peptides in clinical trial ,chemical biology of Oxytocin, valinomycin and enkephalins	18
4	Preformulationstudies, Formulation development, Aggregation in protein formulation, novel formulation approaches, Lyophilization, Pharmaceutical Processing, and Handling of Therapeutic Peptides and Proteins	6
5	Circular dichroism, UV, IR, Mass and fluorescence spectroscopy of peptides	4
	Total lecture	42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

1. Ajay K Banga, "Therapeutic peptides and protein: formulation processing and delivery system, Second edition, Taylor and Francis.
2. Lehninger Principles of Biochemistry Cox, M.M. and Nelson, D.L. and Lehninger A. L. 4th edition.
3. Biochemistry- J.M. Berg, J.L.Tymoczko, and LubertStryer; 5th edition W.H. Freeman and Company, New York, USA.

Suggested Reference Book(s):

1. Gregory A. Grant, "Synthetic peptides A Users Guide" 2nd ed. W. H. Freeman and Company

EvaluationScheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Peptide Therapeutics	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	1	-	-	2	3	3	3	1.92
CO-2	2	3	3	3	2	2	-	-	2	3	3	3	2.17
CO-3	3	3	3	3	3	2	-	-	2	3	3	3	2.33
CO-4	3	3	2	3	3	2	-	-	2	3	3	3	2.25
CO-5	3	3	2	3	2	2	-	-	2	3	3	3	2.17
Average	2.60	3.00	2.40	2.80	2.40	1.80	0.00	0.00	2.00	3.00	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

RF and Microwave

COURSE CODE:15B1WEC732

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Basic Knowledge of Electromagnetic Engineering

Course Objectives:

3. To lay strong foundations in RF and microwave engineering.
4. To apply the theoretical knowledge acquired in the design of different components in microwave systems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the basics of RF and microwave components	Familiarity
CO-2	To understand the parameters involved in microwave receiver	Familiarity
CO-3	To understand the parameters involved in microwave transmitter	Familiarity
CO-4	To know about the design of RF filters	Usage
CO-5	To understand active microwave components and their use in different applications	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Review of Waves and Transmission Lines:** Wave Propagation, Transmission Line Equations, Reflection, Transmission, and impedance for a Terminated Transmission Line, Voltage Standing-Wave Ratio, Decibels, insertion Loss, Return Loss, Smith Charts, S-Parameters, Impedance Matching Networks	8
2	**Receiver System Parameters:** Typical Receivers, System Considerations, Natural Sources of Receiver Noise, receiver Noise Figure and Equivalent Noise Temperature, Compression Points, Minimum detectable Signal and Dynamic Range, Third-Order Intercept Point and Intermodulation, spurious Responses, Spurious-Free Dynamic Range	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3	**Transmitter and Oscillator Systems:** Transmitter Parameters, Transmitter Noise, Frequency Stability and Spurious Signals, Frequency Tuning, Output Power, and Efficiency,Intermodulation, Crystal Reference Oscillators, Phase-Locked Oscillators, frequency Synthesizers	6
4	**Design of RF filters:**Periodic Structures, Filter Design by the Image Parameter Method, Filter Design by the Insertion Loss Method, Characterization by Power Loss Ratio Filter transformations, Filter Implementation, Stepped-Impedance Low-Pass	8
5	**Active RF and Microwave devices:**RF diodes, BJT, FET, microwave amplifier design, oscillators, frequency multipliers and mixers.	8
6	**Wireless Communication Systems:** Friis Transmission Equation, Space Loss, Link Equation and Link budget, Effective Isotropic Radiated Power and G/T Parameters, Radio/Microwave Links, Satellite Communication Systems, Mobile Communication Systems and Wireless cellular phones, Personal Communication Systems	4
Total lectures		**42**

Suggested Text Book(s):

4. Kai Chang,RF and Microwave Wireless Systems,John Wiley & Sons,2000.
5. Pozar, David M. "Microwave engineering" John Wiley & Sons,2009.

Suggested Reference Book(s):

4. R.E.Collin, "Foundations for microwave Engineering", 2nd edition,Tata Mc Graw Hill,1992.
5. Annapurna Das,Sisir.K.Das,"MicrowaveEngineering",Tata McGraw Hill, 2000.

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/117101119/
2. https://nptel.ac.in/courses/117105138/

2.Link to topics related tocourse:

i. https://nptel.ac.in/courses/117105138/ 1 to 20
ii. https://nptel.ac.in/courses/117101119/ 1 to 16

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Robotic Systems and Control

(Elective Subject)

Course Code:	17B1WEC733	Semester:	7th Semester, B. Tech (ECE)
Credits:	3	Contact Hours:	L-3, T-0, P-0

Course Objectives

The objectives are to study

1. The Robotics' chief objective has always been associated with working for new and updated technologies, for example embedded systems, microcontrollers and VLSI.
2. To use the robotic system for logic building and programming.
3. To use the robotic kits to do any given engineering task which may have not been taught in class.

Course Outcomes

After studying this course the students would gain enough knowledge

1. Students will be equipped with the automation and brief history of robot and applications.
2. Students will be equipped with the principles of various sensors, actuators and their applications in robots.
3. Be able to analyze any physical system using mathematical model.
4. Be able to do the path planning on robotic systems using various control strategies.
5. Students will be equipped with the simulation and hands on robotic kits.

Course Contents

Unit	Topics	References (chapter number, page no. etc)	Lectures
1.	Introduction to Robotics: Introduction – brief history, types, classification and usage, Science and Technology of robots, textbooks and research journals, introduction to simulation environment.	Spong : Chapter 1	3
2.	Elements of Robots: Joints, links, actuators, and sensors: Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.	Spong : Chapter 1, 2 eLSI project material	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3	Robot Arm Kinematics and Dynamics: Forward kinematics, inverse kinematics, Lagrange formulation of dynamics.	Spong : Chapter 3, 4, 6	8
4	Motion Planning and Control: Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of constrained manipulators, Cartesian control, Force control and hybrid position/force control, Advanced topics in non-linear control of manipulators.	Spong : Chapter 7, 8, 9	8
5	Modeling and Control of Flexible Robot Manipulators: Models of flexible links and joints, Kinematic modeling of multi-link flexible robots, Dynamics and control of flexible link manipulators, Numerical simulations results.	Craig: Chapter 5 NPTEL lectures	6
6	Robot Programming: MATLAB and other simulation platforms, Hands on experiment on robotic kits, working and implementing various Ad-on modules.	eLSI project material	6
		Total Number of Lectures	41

Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
   - 10 Marks : Class performance, Tutorials & Assignments
   - 10 Marks : Quizzes
   - 5 marks : Attendance

Text Books

1. Spong and Vidyasagar, "Robot Dynamics and Control", John Wiley and Sons.
2. J. J. Craig, "Introduction to Robotics: Mechanics and Control", Pearson.
3. Sciavicco and Siciliano, "Modeling and Control of Robot Manipulators", McGraw Hill International Edition.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Reference Books/ Other resources

1. NPTEL Lectures: http://nptel.ac.in/courses/112101099/
2. Material provided by IIT Bomaby under eLSI project:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Social and Information Network Analysis

COURSE CODE: XXXXX
COURSE CREDIT: 2
CORE/ELECTIVE: ELECTIVE
L-T-P: 2-0-0

Pre-requisites: Graph Theory, Probability

Course Objectives:

1. To analyze the large networks on models and algorithms that abstract their basic properties.
2. To explore how to practically analyze large-scale network data and how to reason it through models for network structure and evolution
3. To do the friend prediction in online social networks
4. To identify the functional modules in biological networks and disease outbreak detection.

Course outcomes:

S.NO	Course Outcomes	Level of Attainment
CO-1.	Understand what constitutes a social network	Familiarity
CO-2.	Represent networks in graph-theoretic language	Assessment
CO-3.	Design effective and reliable network research projects	Assessment
CO-4.	Configure network and attribute data for standard software packages	Assessment
CO-5.	Comprehend the reasons for using, and principles of, permutation tests	Assessment
CO-6.	Apply centrality measures appropriately	Assessment

Course Contents:

	Topics	Topics Outcomes	No of Lectures
1	Introduction	1.Understand what constitutes a social network 2. Identify and describe different levels of analysis 3. Formulate problems in terms of network variables	3
2	Mathematical Foundations	1. Represent networks in graph-theoretic language 2. Identify paths, walks, trails and components	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

		3. Formulate networks in matrix terms 4. Compute and interpret multiplication of adjacency matrices	
3	Research Design	1. Design effective and reliable network research projects 2. Identify sources and boundaries of network data 3. Understand and minimize the effects of data error	4
4	Data Collection	1. Identify sources of network data 2. Design effective network questionnaires 3. Mine archival and electronic sources for network data	3
5	Data Management	1. Configure network and attribute data for standard software packages 2. Apply elementary transformations to matrix data 3. Extract and reconfigure network and attribute data	4
6	Multivariate Techniques Used in Network Analysis	1. Represent one- and two-mode data in a two-dimensional map 2. Cluster data into groups using hierarchical clustering 3. Correctly interpret the information contained in the clusters and maps	4
7	Visualization	1. Visualize networks with or without node attributes in a meaningful	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

		way 2. Embed edge characteristics in network diagrams 3. Represent network change over time graphically	
8	Testing Hypotheses	1. Comprehend the reasons for using, and principles of, permutation tests 2. Formulate testable hypotheses at the dyadic, monadic and whole-network level 3. Understand when SIENA and exponential random graph models may be appropriate	4
9	Characterizing Whole Networks	1. Calculate and interpret cohesion measures in a whole network 2. Undertake a triad census 3. Compute and evaluate measures of transitivity, reciprocity and clustering	4
10	Centrality	1. Apply centrality measures appropriately 2. Interpret the results of a centrality analysis on undirected, directed and valued data 3. Understand the limitations and constraints of the standard centrality measures	4
11	Subgroups	1. Understand the similarities and	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		differences of the main approaches in detecting cohesive subgroups 2. Select appropriate methods given the size and nature of the network 3. Perform a cohesive subgroup analysis on a variety of types of network	
			Total=42

Suggested Text Book(s):

1. Analyzing Social Networks 1st Edition by Stephen P Borgatti, Martin G. Everett, Jeffrey C. Johnson, SAGE Publications Ltd; 1 edition

Suggested Reference Book(s):

2. Influence and Behavior Analysis in Social Networks and Social MediabyMehmet Kaya, Reda Alhajj, Lecture Notes in Social Networks, Springer International Publishing
3. Emerging Research Challenges and Opportunities in Computational Social Network Analysis and Mining by Nitin Agarwal, NimaDokoohaki, Serpil Tokdemir, Lecture Notes in Social Networks, Springer International Publishing

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	35	2 hours	Syllabus covered upto Test-3
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10-	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	1	3	1	3	2.4
Average	3	3	3	2	2.7	2.8	2	2	2.3	3	1	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Switching Theory and Logic Design

COURSE CODE: COURSE

CREDITS: 3

CORE/ELECTIVE: ELECTIVE L-T-P:

3-0-0

Pre-requisite: None

Course Objectives:

1. To make the students understand the concepts of digital circuits.
2. To design complex digital circuits based on the given requirement.
3. Understand the programming of digital circuits using VHDL.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic concepts of digital circuits.	Familiarity
CO-2	Learn about different the basic principles used in the working of digital circuits.	Familiarity
CO-3	Understand various hazards encountered in designing these circuits.	Assessment
CO-4	Learn to write programs using VHDL.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Digital Circuits: Design of combinational circuits, Quine- McCluskey method, sequential machine fundamentals - the need, concept of memory, Flip flops, sequential machine operations, classifications. Switching Circuits. Logic families: TTL, nMOS, CMOS, dynamic CMOS. Logic design using ROMs, PLAs and FPGAs. Case studies	5
2	Design of Synchronous Sequential Circuits: Sequential circuits, Finite state model – Basic definition, capabilities and limitation of finite state machines, state equivalence & machine minimization, simplification of incompletely specified machines, Extraction of maximal compatibles, synthesis & analysis of synchronous sequential circuits.	8
3	Design of Asynchronous Sequential Circuits: Introduction to asynchronous circuits, timing diagram, state diagram & flow tables, types of asynchronous circuits, fundamental mode circuits, pulse mode circuits, state assignment in asynchronous sequential circuits, Synthesis and analysis, ASM charts: Representation of sequential circuits using ASM charts.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Hazards and Races: Introduction, gate delays, generation of spikes, production of static hazards in combinational networks, elimination of static hazards, design of hazard free combinational networks, hazard free asynchronous circuit design, dynamic hazards, essential hazards, Races and Cycles.	9
5	VHDL/Verilog HDL: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches. Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.	12
Total lectures		42

Suggested Text Book(s):

1. Switching and Finite Automata Theory, ZVI Kohavi, Third Edition, Cambridge University Press.
2. John M Yarbrough : Digital Logic Applications and Design, 2nd Edition, Thomson Education
3. W. I. Fletcher :An Engineering approach to Digital Design , PHI

Suggested Reference Book(s):

1. Digital Systems Design using VHDL – Charles H Roth, CENGAGE Learning.

Other useful resource(s):

1. NPTEL: https://nptel.ac.in/courses/106/105/106105185/
2. Coursera: https://www.coursera.org/learn/digital-systems
3. Swayam: https://swayam.gov.in/nd1_noc19_cs74/preview

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Switching Theory and Logic Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	x	x	x	1	3	3	2.22
CO-2	3	3	3	2	2	3	x	x	x	1	2	3	2.44
CO-3	3	3	2	3	3	2	x	x	x	1	2	3	2.44
CO-4	3	3	2	3	3	2	x	x	x	1	3	2	2.44
Average	3	2.75	2.25	2.5	2.5	2.25	x	x	x	1	2.5	2.75	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

TIME FREQUENCY ANALYSIS AND ITS APPLICATIONS

(Elective Subject)

Course Code:	**17B1WEC731**	**Semester:**	**7th Semester, B. Tech (ECE)**
Credits:	**3**	**Contact Hours:**	**L-3, T-0,P-0**

Pre-requisites: Signal & System, Digital Signal Processing

Course Objectives:

The objective of this course to provide the understanding of basics concept and MATLAB based implementation of time-frequency analysis (TFA) tools for various applications.

Course Outcomes

After the study of this course students will be able to:

1. Understand the spectral analysis of the signals.
2. Understand the basics concept of the short time Fourier transform.
3. Familiar with the basics concept of the discrete wavelet transform /continuous wavelet transform.
4. Understand the basic concept of the distribution based Time-Frequency Analysis tools
5. Develop the TFA based algorithms for various applications.

Course Contents :

Unit	Topics	Text book	Lectures
1	**Introduction to spectral analysis:** Parametric and Non-Parametric methods	[1]	08
2	**Basic Concepts & Definition of time-frequency tools:** Bandwidth Equation, uncertainty concept, Instantaneous Frequency, Analytic Signals, Multicomponent Signals etc.	[2]	04
3	**Short Time Fourier Transform:** Conditions for valid windows, Time domain and frequency domain formulations, Duality in the interpretations, MATLAB based implementation of STFT	[2] & [6]	04
4	**Wavelet transforms:** Introduction and basic concept of continuous and discrete wavelet transform, MATLAB based implementation of wavelet transform.	[3] &[6]	04
5	**Distributions based time-frequency tools:** Introduction and basic concept Wigner-Ville distribution & Cohen's class of distribution etc. MATLAB based implementation of distribution based time-frequency analysis tools.	[2] &[4]	06
6.	**Case studies:** Joint Time-Frequency Transform/ Inverse Synthetic Aperture Radar, Joint Time-Frequency Representations/Time-Varying Signals, Economic Data Analysis with the Gabor Spectgrogram, Gabor Spectrogram in Ultrasonic Nondestructive Materials Evaluation, Applications of Time-Frequency Signal Processing in Wireless Communications and Bioengineering	[2], [3], [4] & [5]	16
	Total Hours		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
    1. 10 Marks : Class performance, Tutorials & Assignments
    2. 10 Marks : Quizzes
    3. 5 marks : Attendance

Text Books

1. Hayes, M.H.,"Statistical digital signal processing and modeling" Willey publishers
2. Boualem Boashash, Time-Frequency Signal Analysis and Processing: A Comprehensive Reference, Elsevier publishers, 2003
3. S. Mallat, A Wavelet Tour of Signal Processing - The Sparse Way. Elsevier, Third Edition, 2009.
4. L. Cohen, Time-Frequency Analysis. Prentice Hall, 1995.
5. Hao Ling and Victor C. Chen, Time-frequency Transforms for Radar Imaging and Signal Analysis, Artech House Publishers, 2000
6. http://nptel.ac.in/courses/117101001/: The lecture series on Wavelets and Multirate Digital Signal Processing created by Prof. Vikram M. Gadre in NPTEL.

REFERENCE BOOKS

1. Stanskovic L., Dakovic, M., Thayparan, T., Time-Frequency Signal Analysis and Processing: A Comprehensive Reference, Artech House Publishers.
2. Karlheinz Gröchenig, Foundations of Time-Frequency Analysis, Birkhäuser publishers, 2001
3. M. Vetterli, J. Kovacevic, and V. K. Goyal, Fourier and Wavelet Signal rocessing. Booksite: **http://fourierandwavelets.org/terms.php**

OTHER RESOURCES

Time-frequency toolbox (MATLAB) is available for download from **http://tftb.nongnu.org/**

http://nptel.ac.in/courses/117101001/1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Underground Technology

COURSE CODE:18B1WCE638

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Geotechnical Engineering and Foundation Engineering

Course Objectives:

1. To impart the knowledge of recognizing the diversity and complexity of underground excavations and associated works such as foundation construction.
2. To provide guidance for support selection of underground openings which is dependent upon the ground conditions, excavation size and shape and excavation method employed.
3. To inculcate the understanding of ground improvement and develop knowledge of different ground improvement techniques.
4. To understand, analyze and design flexible retaining structures
5. To provide knowledge of tunneling and various aspects of tunnel engineering.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the conditions and structures required for underground structure.	Familiarity
CO-2	Stabilize excavation for underground construction using sheet piles, anchored bulkheads, management of ground water conditions and apply dewatering methods.	Assessment
CO-3	Design and understand the construction methodology of deep foundation, analyze side - support systems for underground excavations.	Assessment
CO-4	Solve problems related to required ground conditions, side – support system, lining and design tunnels with its various components.	Usage
CO-5	Understand the construction methodologies for side - support system required for underground excavation , coffer dams, caissons, wells, basement and tunnel construction.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction**: Introduction to various underground structures, Underground construction methodology &equipments.	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Department of Civil Engineering

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	**Underground construction**: Excavations, soil support methods, diaphragm walls, reinforced earth.	5
3	**Ground Water management**: Management of groundwater, dewatering methods Coffer dams, Caisson & wells.	6
4	**Permanent Support and Temporary Support system**: Methods of Basement construction, bracing system.	8
5	**Ground Improvement**: Grouting, In – situ Densification: Preloading, Compaction Grouting, Dynamic Compaction, Blast densification, Vibro–Compaction and Vibro–Replacement, Compaction piles, Reinforcement of embankments and foundations.	6
6	**Tunnels**: Introduction, Tunnel stabilization and lining, Cut and Cover Tunnels, Bored Tunnels, Immersed Tube Tunnels, Water Conveyance Tunnels, Micro-tunnels.	6
7	**Underground Conduits**: Ditch Conduits, Positive Projecting Conduits, Negative Projecting Conduits, Imperfect Ditch Conduits, Tunneled Conduits.	6
Total lectures		42

Suggested Text Book(s):

1. Geotechnical Engineering by Gulati and Dutta (TMH)
2. Tunnel Engineering Handbook edited by Bickel, Kuesel and King

Suggested Reference Book(s):

1. Foundation Engineering Handbook, edited by Winterkorn & Fang
2. Construction technology by Roy Chudley& Roger Green
3. Advance Construction Technology by Roy Chudley& Roger Green
4. Railway Bridges and Tunnels by Vazirani and Chandola

Other useful resource(s):

1. Link to NPTEL course content: https://nptel.ac.in/courses/105103093/24
2. Links related to topics of course:_
   https://nptel.ac.in/courses/105108069/5
   https://freevideolectures.com/course/3269/advanced-foundation-engineering/25
   https://nptel.ac.in/courses/105106055/

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Underground Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	1	2	2	0	3	3	1	1	**2.0**
CO-2	2	3	3	2	2	3	2	1	2	1	1	3	**2.1**
CO-3	3	2	2	2	1	3	1	1	2	2	2	3	**2.0**
CO-4	3	3	3	2	2	3	2	2	1	1	1	2	**2.1**
CO-5	3	3	3	2	0	2	1	1	2	1	2	3	**1.9**
CO-6	2	2	2	2	1	3	3	0	3	2	2	3	**2.1**
Average	**2.67**	**2.5**	**2.67**	**2.17**	**1.17**	**2.67**	**1.83**	**0.83**	**2.17**	**1.67**	**1.5**	**2.5**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Advanced Algorithms for Bioinformatics

COURSE CODE: 18B1WBI631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basics of data structures, algorithms, and basic methods in computational biology

Course Objectives (Learning Goal):

1. The overall objective of the course is to develop an understanding of algorithms implementation for solving problems in biology.
2. To evaluate existing algorithms, possible improvements and for their implementations.

Course Outcomes:

CO I	Able to apply algorithmic principles to address problems in biology
CO II	Use various methods from computational biology to implement their algorithmic versions
CO III	Analyze problems in biology and able to design new protocols and algorithms for biological data analysis
CO IV	Able to analyze the algorithms in computational biology and identify their limiting factors to propose new design principles
CO V	Assessment of biological complexity through algorithmic principles

Course Contents:

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction	An overview of Algorithms, Sequence and String search algorithms with mathematical formulations for similarity and distance scoring systems with their algorithmic implementations.	6
2	Genome Assembly	Complexity of DNA problems and their simulatory solutions. Genome assembly algorithms, their computational implications and applications.	7
3	Graph based Algorithms	Graph algorithms in bioinformatics and their applications to fragment assembly, Eulerian and Hamiltonian Cycle Problem, Interval graph algorithm, shortest superstring problem and its mapping with	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

		traveling salesman problem.	
4	Motif and Regulatory element's Algorithms	Algorithms for finding regulatory motifs in genomic sequences through profiles and consensus approaches. Brute Force Motif Search, Median String Search algorithms and their refinements. Algorithms for Sequencing by hybridization (SBH), use of spectrum approach to solve SBH problem.	5
5	Gene prediction	Algorithmic approaches for Contig assembly to super-contigs. Computational challenges for gene prediction, popular algorithms and their implementations for gene prediction. Exon chaining and Spliced Alignment Problems.	7
6	Brute Force and branch and bound algorithms	Brute Force and branch and bound algorithms for Partial Digest Problem, restriction mapping, partial digest and double digest problems and their solutions through multiset and homometric sets.	5
7	MSA advancedments	Progresssive and iterative refinements of MSA algorithms, Barton-Sternberg Iterative Refinement Algorithm, STAR and TREE alignment approaches, Greedy and Entropy approach for MSA.	5
8	Graph based MSA advancements	Partial Order (PO)-MSA, and A-Bruijn Alignment (ABA) algorithm for MSA. Combinatorial dynamic programming approach for MSA.	3
	Total Number of Lectures		**42**

Suggested Text Book(s):

1. Computational Molecular Biology: An algorithmic approach (2004), P.A. Pevzner, PHI.
2. An Introduction to Bioinformatics Algorithms (2004) N.C. Jones and P.A. Pevzner Ane Books.
3. Algorithms in Bioinformatics (2004), G. Benson and R. Page (Eds): Springer Verlag.

Suggested Reference Book(s):

1. Bioinformatics Algorithms: Techniques and Applications, I.I. Mandoiu and A Zelikovsky, Wiley Interscience Press.
2. Biological Sequence Analysis: Probabistic models of proteins and nucleic acids (1998) Durbin R., et al, Cambridge University press.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Advanced Algorithms for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	1	3	2	2	2	1	3	2	3	3	**2.25**
CO-2	3	2	2	1		1				1	2	3	**1.88**
CO-3	3	3	3	3	2	2	2	1	2			2	**2.30**
CO-4	3	3	3	1					2	1	2		**2.14**
CO-5	3	1	2	2	2	2		1		2		1	**1.78**
Average	2.8	2.4	2.2	2	2	1.75	2	1	2.33	1.5	2.33	2.25	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Advanced Structural Analysis

COURSE CODE:18B1WCE631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Structure Analysis

Course Objectives:

1. To impart the knowledge of matrix method to solve determinate and indeterminate structure.
2. To provide basic knowledge of moving loads and influence line.
3. To learn how different design software use matrix method.
4. To learn basics of finite element method.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The students will be able to solve basic determinate and indeterminate problems from matrix method by using hand calculation.	Assessment
CO-2	Student will able to visualize the principle on which design software works.	Assessment
CO-3	Student will able to determine design loads for a given cross section of structure.	Assessment
CO-4	Student will come to know why earlier methods used for solving indeterminate structure are discarded in this era.	Usage
CO-5	Student will learn basic concept on which Finite Element Method works.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: Revision of basics of structure analysis	2
2	**Kani's Method**: Kani's method to analyze simple portal frames	5
3	**Flexibility Method**: Derivation of flexibility method, compatibility equation and its application on truss, beams and frames, Flexibility matrix Method.	10

Department of Civil Engineering

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	**Influence Line**: Influence line for indeterminate structures, Influence lines for indeterminate beams using Muller Breslau principle. Influence lines for arches and stiffening girders.	8
5	**Stiffness Method**: Degree of freedom, Derivation of stiffness matrix, transformation matrix for 2d beam, truss and frame, matrix solution for beam, truss and frame.	12
6	**Approximate Analysis of frames**: Approximate analysis of frames for vertical loads and horizontal loads on it.	5
Total lectures		42

Suggested Text Book(s):

1. Devdas Menon: Advanced Structural Analysis, Narosa, 2009
2. Ashok kumar Jain: Advanced Structural Analysis, 3rd Edition, Nem Chand & Bros, 2015

Suggested Reference Book(s):

1. Aslam Kassimali: Matrix Analysis of Structure, 2nd Edition, Cengage Learning, 2012.
2. C.K, Wang: Intermediate Structural Analysis, 7th Ed., Mc Graw Hill, 2008

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105106050/#

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title	**Advances in Gene Manipulation**	**(Elective Course)**
Course Code		
Course Credit	03	

L	T	P
3	0	0

Course Coordinator Dr Anil Kant

Pre-requisite

Course Objectives

This is an advance course with objective expose students to the advanced topics of Genetic Engineering

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Covered Up Till T1
T2 Test	25	1.5 hrs.	Covered Up Till T2
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	Students will acquire knowledge about the gene cloning and expression tools developed bacterial host other than *E.coli*
CO II	Students will have understanding about gene cloning and expression in fungal hosts
CO III	Students will acquire advance knowledge about genetic engineering of animals and plants
CO IV	Understanding of other gene manipulation methods such as site directed mutations, use molecular markers, gene knock down knock in etc
CO V	Students will be able to comprehend the recent development in the area of genome editi tools and their application

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Cloning in bacteria other than *Escherichia coli*	*Cloning Vectors* and Cloning in Gram-negative bacteria other than E. coli, *Cloning Vectors and* Cloning in Gram-positive bacteria	7
2	Cloning in *Saccharomyces cerevisiae* and other fungi	Importance, Yeast and fungi transformation, Different kinds vectors of *S. Cerevisiae*, *Cloning and manipulating large fragments of DNA* Yeast promoters, Hetrologus protein expression in yeast and Phichia,	7
3	Gene transfer to animal cells	Chemical transfection techniques for animal cells, Physical transfection techniques, selectable marker for animal cells, Plasmid, Viral vectors for the transfection of animal cells	8
4	Genetic manipulation of animals	Development of transgenic mice, Applications of genetically modified mice, Nuclear transfer technology to clone animals, Gene transfer to Xenopus oocytes or germline, Gene transfer to fish and drosophila,	6
5	Gene manipulation by Site-directed mutagenesis	Introduction, Methods of introduces changes in target genes. (Primers extension and PCR as method for site-directed mutation), *Protein engineering:* Methods for amino acid substitutions at a selected site	4
6	Genomic approaches of gene manipulation	Molecular markers, Marker assisted selection, Gene expression studies	4
7	Gene and Genome manipulation by silencing recombination and editing	RNAi mechanism and delivery and applications, Recombinase based gene knock out and gene knock in, Gene editing tools and their delivery, Advancement in genome editing tool, Application of genome editing	6
	Total Contact Hours		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Principles of Gene Manipulation and Genomics SEVENTH EDITION S.B. Primrose and R.M. Twyman
2	Genetic Engineering; Samita Rastogi and Neelam Pathak
3	Recombinant DNA: A Short Course by JD Watson, J. Tooze and DT Kurtz.

REFERENCE BOOKS

1	Research and Review Articles:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Applied Environmental microbiology

COURSE CODE – 20B2WCE605

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE
L-T-P: 3-0-0

Pre-requisite: Basics of chemistry

Course Objectives:

1. To familiarize the students with the chemical aspects and principles as applied to environmental engineering.
2. To develop the understanding about the biological principles as linked with the environmental engineering.
3. To be able to apply the physical, chemical and biological parameters of the treatment and pollution control.
4. To lay out the ground work for understanding water and waste water analysis on fundamental basis of environmental engineering practice and research.
5. To analyze and interpret the environmental engineering systems from chemistry and microbiological point of view.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic concepts of environmental chemistry, chemical equilibrium, reaction kinetics and acids and base in dealing with managing environmental problems.	Familiarity
CO-2	Understand the detailed concepts of microbiology features like bacteria, fungi, algae and various others forms of higher forms and their role in environment and its sustainability.	Familiarity
CO-3	Understand the importance of the microbial growth and enumeration, control of microorganisms and microbial diversity.	Assessment
CO-4	Comprehend the different components of metabolic pathways for remediating contaminated water, hazardous and solid waste and soil.	Usage
CO-5	Understand the impact of pollutants on environment, self-purification and disposal standards using various modelling methods.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: Importance of chemistry and microbiology in environmental engineering, its related uses and applications.	2
2	**Chemical Reactions:** its types, solutions, activity, reactivity, coefficients, equilibrium involved and thermodynamics in relation to sustainable environment.	4
3	**Acid base equilibrium**: Equilibrium diagrams, carbonic acid system, buffering, Solubility Equilibrium, effect of other solutes on salt solubility, removal of heavy metals.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

4	**Oxidation reduction equilibrium**: Electrochemistry and electrochemical cells, stability diagrams measuring redox potentials.	6
5	**Water stabilization**: Water softening and water conditioning, chemical precipitation, ion exchange.	2
6	**Basics of quantitative chemistry:** analytical methods, instrumentation: Organic pollution: BOD, COD, TOC.	4
7	**Microbiology**: Classification, identification, Taxonomy, Reproduction and growth, cultures & characteristics, Enzymes, Microbial metabolism - energy production, biosynthesis, Mixed and pure culture, Growth rate; Application.	8
8	**Microbiological Variants:** Fungi, Bacteria, molds and yeast, algae, protozoa, viruses. Control of microorganisms.	4
9	**Environmental Applications of Microbiology:** Microbiology of domestic water and wastewater, industrial microbiology. Epidemiology of infectious diseases, microbial agents of diseases.	4
Total lectures		**42**

Suggested Text Book(s):

1. J. S Birdie, G S Birdie: Water Supply and Sanitation Engineering, 9th Edition, Dhanpat Rai Publications, India, 2014.
2. Garg S.K: Environmental Engineering – Water Supply Engineering (Volume -1), Khanna Publishers, India, 2015.
3. B.C. Punmia, A.K. Jain, A.K. Jain: Water Supply Engineering, 2ndEdition, Laxmi Publications. India,2016.
4. Integrated Computer Applications in Water Supply: Applications and Implementations for Systems Operation and Management by Bryan Coulbeck (Volume 2), Annotation copyright Book News, Inc. Portland, Or.

Suggested Reference Book(s):

1. H. Peavy, D. Rowe, G.Tchobanoglous "Environmental Engineering", IstEdition, McGraw Higher Education Publications, India, 2017.
2. Chemistry for Environmental Engineering, Sawyer C.N., McCarty P.L., McGraw Hill Book Company, New York, 2002.
3. Microbiology – Concepts and applications, Pelczar M.J., McGraw Hill Book Company, New York,6th edition

Other useful resource(s):

1. Process Chemistry for water and wastewater treatment: Benefield L.D., Judkins J.F., Weand B.L., Prentice-Hall Inc, 1982.
2. Microbiology for Environmental Scientists and Engineers, Gaudy Jr. A.F. and Gaudy E.T., McGraw Hill Book Company, New York,1980
3. Standard Methods for the Examination of water and wastewater: APHA, WPCF,2005

Department of Civil Engineering

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (10) - 10 Presentation(1) -10 Attendance/Quiz -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Environmental Chemistry and Microbiology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**2**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
CO-5	2	2	3	3	3	2	2	1	3	2	2	2	**2.25**
Average	**2**	**2.4**	**2.6**	**2.6**	**2.6**	**1.4**	**1.6**	**1**	**2.2**	**2.2**	**1.6**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Architecting Distributed Cloud Applications

COURSE CODE: XXX **COURSE CREDITS:** 2 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 2-0-0

Pre-requisite: Cloud Computing, Distributed applications, Basic networking concepts.

Course Objectives:

1. To understand cloud distributed applications.
2. To know the benefits and challenges of microservices architecture.
3. To learn the fundamentals of service endpoints, scalability, and availability.
4. To know the fundamentals of messaging with queues.
5. To understand best practices for managing service configuration.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Introduction to cloud computing and distributed cloud applications	Familiarity
CO-2	Network Communication in distributed cloud applications	Assessment
CO-3	Message Communication in distributed cloud applications	Assessment
CO-4	Versioning, upgrading, and configuration of distributed cloud applications	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Module 1:** **Cloud Computing Introduction:** Cloud computing definition, benefits of cloud computing. What are cloud applications, why develop cloud applications, what are orchestrators and containers in the cloud, the difference between orchestrators and containers? What are micro-services, why convert monolith applications to micro-services, micro-service architectural myths, auto-scaling of cloud microservices?	5
2	**Module 2: Network Communication** Network issues for distributed cloud applications, service endpoint scalability, and availability, forward and reverse proxies, cluster DNS, reverse proxy load balancers. What are service APIs for distributed cloud applications? Fault-tolerant network communication, circuit breaking.	4
3	**Module 3:Messiging Communication** What is message communication, benefits of message communication,	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	messing with queues, fault-tolerant messaging process, some queue features?	
4	**Module 4: Versioning, upgrading, and configuration** Service update options, rolling updates feature, shutting down a service, gracefully shutting down a service, service configuration, and reconfiguration.	4
5	**Module 5: Leader Election** What is leader election, why we need leader, main roles, and responsibilities of a leader, leader election via lease, leader election via queue messages?	5
6	**Module 6: Storage Services** Introduction to data storage services, data temperature, object storage services, database storage services, backup restore, and disaster recovery.	6
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice-Hall, ISBN: 9780133387568
- Wilder, B. (2012). Cloud architecture patterns: using Microsoft azure. " O'Reilly Media, Inc.".

Suggested Reference Book(s):

- Srinivasan, V., Ravi, J., & Raj, J. (2018). Google Cloud Platform for Architects: Design and manage powerful cloud solutions. Packt Publishing Ltd.

Other useful resources (s):

This course is designed based on a famous course provided by Microsoft. Links to courses and content are as follows:

- https://courses.edx.org/courses/course- v1:Microsoft+DEVOPS200.9x+3T2019/course/
- https://azure.microsoft.com/en-in/blog/architecting-distributed-cloud-applications- free-video-course/
- https://www.youtube.com/watch?v=xJMbkZvuVO0&list=PL9XzOCngAkqs0Q8Z RdafnSYExKQurZrBY

EvaluationScheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Architecting Distributed Cloud Applications)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	1	1	1	1	1	1	1	1	1.4
CO-2	3	3	3	2	2	1	1	1	1	1	3	1	1.8
CO-3	3	3	3	2	2	2	1	1	1	1	3	1	1.9
CO-4	3	3	3	2	2	1	1	1	1	1	3	1	1.8
Average	3	3	2.8	1.8	1.8	1.3	1	1	1	1	2.5	1	1.8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

15B1WCI833: Big Data Analytics

Course Credit: 3
Semester: VIII

Course Coordinator: Dr. Pardeep Kumar

Introduction

This course introduces basic technology (algorithms, architectures, systems) and advanced research topics in connection with large-scale data management and information extraction techniques for big data. The course will start by introducing the fundamentals of Big data and cover modern distributed database systems and algorithms and Big data systems adopted in industry and science applications. Distributed storage and parallel processing and architectures that support data analytics will be examined, and students will learn how to implement a distributed data processing system. The course will also cover critical topics in mining and knowledge discovery of big data, with applications in social analytics, cyber security, and information networks, among others that are already in public eye.

Course Objectives (Post-conditions)

Knowledge objectives:

1. Understand the need for Bid Data Analytics

2. Master the concepts of large scale file systems and map reduce framework

3. Master the concepts of mining data streams

4. Master the concepts of Link analysis and frequent item sets discovery from Big data

5. Master the concepts of clustering for streams and parallelism.

Application objectives:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Understand and apply the Big Data Analysis techniques to real world problems including social analytics, cyber security, and information networks, among others that are already in public eye.

2. Being able to describe and apply the Data Analytics lifecycle to Big Data projects including set up of smart cities.

Expected Student Background (Preconditions)

1. Good knowledge of Statistics
2. Working knowledge of databases
3. Good knowledge of data structures and algorithms

Topics Outline:

Serial Number	Topics	Hours
1	Introduction to Big Data: Big data time line, Why this topic is relevant now? Is big data fad? Where using big data makes a difference? Introduction to statistical modeling and machine learning, Ordinary data processing versus big data processing: Challenges and opportunities	3
2	Map Reduce and the New Software Stack: Distributed File Systems, Map Reduce, Algorithms Using Map Reduce, Complexity Theory for Map Reduce	3
3	Mining Data Streams: The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments and Windowing, Decaying Windows	5
4	Link Analysis: Page Rank and Efficient Computation of Page	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Rank, Topic-Sensitive Page Rank, Link Spam, Hubs and Authorities	
5	Frequent Item sets from Big Data: The Market-Basket Model, Market Baskets and the A-Priori Algorithm, Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream	7
6	Clustering for Big Data: Introduction to Clustering Techniques, Hierarchical Clustering, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism	8
7	Mining Social Network Graphs: Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs, Finding Overlapping Communities, Neighborhood Properties of Graphs	6
8	Recommendation Systems: A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering and Dimensionality Reduction	5
	Total Lectures	42

References

1. Anand Rajaraman and Jeffery David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012
2. Jared Dean, Big Data, Data Mining and Machine Learning, Wiley Big data Series, 2014
3. Judith Hurwitz, Alan Nugent, Fern Halper and Marica Kaufman, Big Data for Dummies, Wiley Press, 2013

Evaluation Scheme:

S. No.	Examination	Marks
1	T1	15
2	T2	25
3	T3	35
4	* Internal Marks	25

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

*Internal Marks Breakdown:

Assignments 9 marks (3x3)

Quizzes 12 marks (3x4)

Regularity 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Bio-resources and Industrial Product (*Core Course*14B1WBT 741)

(B.tech, Sem VIII) **Credits 3**

Lectures 3 Tutorial 0 Practical 0

Pre-requisites: Biochemistry, fundamental biology, chemistry

Course Objectives (Learning Goal):

The use of natural, renewable and/or bio-resources is becoming more and more important to for sustainable growth along with enormous challenges at economic, environmental level. The Objectives of the course are

1. To make the student understand the value of bio-resources
2. Introduction to bio-renewable products, processes and their related industrial sectors viz. Medicine, Food , agriculture , bio-chemicals, bio-composites, bio-energy & biofuel, and forest products.

Course Assessment:

Test 1	15
Test 2	25
Test 2	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

At the end of the course students will have a fundamental understanding of the natural bioresearches and able to

Co-PI: Define "bioproduct" to reflect the scope and focus of opportunities to understand environmentally sustainable science-based processes of conversion of living organism-based resources into manufactured goods

Co-PII:. Develop a workable concept of bio-resource utilization with respect to broad economic feasibility, considerations of bio-resource availability, conversion (technologies) and receptor industries (markets).

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outline

S.N.	Topic		Lecture
1	Overview	• Resources (Renewable & Non-renewable) • Bio-resources • Bio-resources Engineering • Different Scale of Bio-resource Engineering	4
	Raw Material Resource	• Microbial Bio-resources • Plant Bio-resources • Animal Bio-Resources	6
2	Industrial Products	• Novel Plant Bioresources: • Medicine • Food • Cosmetics	12
3	Industrial Products	• Animal Bioresources: • Medicine • Food • Cosmetics	5
4	Industrial Products	• Microbial Bioresources: • Medicine • Food • Cosmetics	6
5	Processing Technology	• Biorefinery Concept • Processes for converting Raw material to biobased product • Novel Development in Procesing Technology	6
6	Case Study	• Case study of lignocellolose-Ethanol Processing	2

Methodology

The course will be taught through lectures. Apart from the discussions on the topics covered in the lectures, presentations, assignments in the form of questionnaires will also be given.

Internal Assessment

Assessment	Marks
Quiz/presentations	15
Assignment	5
Attendance	5
TOTAL	**25**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Books and references

Text Books:

- ✓ Renewable Bioresources: Scope and Modification for Non-food Applications Editors CHRISTIAN V. STEVENS
- ✓ Biotechnology for Agro-Industrial Residues Utilisation Poonam Singh nee' Nigam · Ashok Pandey
- ✓ Emerging Bioresources with Nutraceutical and Pharmaceutical Prospects: Seema Patel
  San Diego State University, San Diego, California, USA, Springer
- ✓ Dairy Chemistry and Biochemistry P.F. FOX and P.L.H. McSWEENEY Department of Food Chemistry University College, Cork Ireland

Reference Books and material

- ✓ Review articles on relevant topics from diverse sources
- ✓ *BioResources* (ISSN: 1930-2126): a peer-reviewed online journal devoted to the
- ✓ science and engineering of lignocellulosic materials, chemicals, and their applications for new uses and new capabilities

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Detailed Course Curriculum (Theory)

Course Name: Block Chain Technologies

Course Code: 18B1WCI836

Course Credit: 3-0-0

Instructor: Dr. Hemraj Saini

Course Pre-requisites (if any): Some programming experience (at least one year suggested). Potential students will need to pass a brief programming assessment for enrollment in the course.

Course Objectives:

Srl	Course Outcomes (Block Chain Technologies) 18B1WCI836	Level of Attainment
CO-1	Explain how bitcoin works, from when a transaction is created to when it is considered part of the blockchain	Familiarity
CO-2	Thoroughly explain private and public keys as well as addresses and how exactly they are constructed and used	Familiarity
CO-3	Expose students to the different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading	Assessment
CO-4	Decompose a blockchain system's fundamental components, how they fit together and examine a modular blockchain system in more detail	Assessment
CO-5	Detailed understanding of naïve Attacks and Trustless Networks of block chain	Assessment
CO-6	Provide a thorough understanding of smart contracts, their technical capabilities, practical applications, limitations and security constraints they operate within	Usage
CO-7	Explain to students both fundamental and implied differences between Ethereum and Bitcoin protocol by covering historical, conceptual and architectural distinctions	Assessment

Detailed Course Contents:

Module	Contents	Lectures required
Module-1	**The story of a transaction** a) From Transactions to Blocks b) Blocks and Distributed Consensus c) Basic interaction with a Bitcoin node	2
Module-2	**Keys and Addresses** a) Basic cryptography b) From private keys to addresses	2
Module-3	**The Bitcoin Script language** a) Introduction to the Bitcoin Script language b) Script writing and execution c) Advanced scripting d) Tools and libraries to access Bitcoin's API and scripting capabilities	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Blockchain deployment a) Mining and forking b) Upgrading the network c) Related BIPs d) Segregated Witness (SegWit)	
Module-4	**Blockchain architectures** a) Abstract Architecture b) Ways to dive deeper c) Introduction to major blockchain platforms	6
Module-5	**Comparing Bitcoin and Ethereum** a) Historical comparison b) Conceptual distinction between a payment system and a decentralized applications platform c) Differences in their architectures from *security-first aspect to a rich feature set* d) Future roadmap for them, following their own paths with probable interconnections	8
Module-6	**Development environment** a) Multitude of clients in Ethereum b) Production and test networks in Ethereum c) *Public, private and development deployments* **Contract code walk-through** a) Demonstration of smart contract b) Introduction to Solidity c) Contract lifecycle	8
Module-7	**Solidity in depth** a) Building blocks b) Popular contracts already in deployment **Considerations for production deployment** a) Quality of decentralized applications b) Code patterns c) *Security* d) Other smart contract platforms e) Discussion of future prospects	8
	TOTAL LECTURES	42

Suggested Text Book(s):

1. Mastering Bitcoin, Andreas Antonopoulos, O'Reilly Publishing, 2014, ISBN: 978-0691171692.
2. Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto, Online 2009 https://bitcoin.org/bitcoin.pdf
3. Vitalik Buterin, Ethereum White Paper, Online, 2017, https://github.com/ethereum/ wiki/wiki/ White- Paper

Suggested Reference Book(s):

4. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, A. Narayanan, J.
5. Bonneau, E. Felten, A. Miller, S. Goldfeder, Princeton University Press, 2016, ISBN: 978-0691171692
6. The Science of the Blockchain, Roger Wattenhofer, CreateSpace Independent Publishing Platform, 2016, ISBN: 978-1522751830
7. Ethereum Programming, Alex Leverington, Packt Publishing Limited, 2017, ISBN: 978-1786463715

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Other useful resource(s):

- Bitcoin Protocol Specifications (https://en.bitcoin.it/wiki/Protocol_specification)
- Bitcoin transaction Scripting (https://en.bitcoin.it/wiki/Script)
- Majority is not Enough: Bitcoin Mining is Vulnerable (http://arxiv.org/abs/1311.0243)
- Two Bitcoins at the Price of One? Double-Spending Attacks on Fast Payments in Bitcoin (http://eprint.iacr.org/2012/248.pdf)
- Ethereum documentation (http://www.ethdocs.org/en/latest)
- Solidity documentation ((https://solidity.readthedocs.io/en/develop))
- https://sites.google.com/site/blockchaintutorial/blockchain-course-content

Assessment scheme:

Teacher Assessment	4 Assignments of 3 marks each to be scaled to 12marks	12	
	Project Evaluation	8	
	Quizzes	5	25
Theory Examination(TE)	Test-1	15	
	Test-2	25	
	Test-3	35	75
		TOTAL:	**100**

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (18B1WCI836)Block Chain Technologies)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	83
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	86
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	81
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	83
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	81
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	86
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	81
Weightage	86	71	86	71	81	86	86	86	71	86	95	90	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

BRIDGE ENGINEERING

CODE:	**11M1WCE133**
CREDIT:	**3**
PRE-REQUISITE:	*Structural Analysis, Design of steel structures and Design of concrete structures*
CLASS:	M-Tech Structural Engineering 2th sem.

COURSE OBJECTIVES:

The main aim of this course is to enable students to choose the appropriate bridge type for a given project and to analyses and design the main components of the chosen bridge. The course also provides students with fundamental knowledge in a wide range of state-of-the-art practices, including code specifications, in bridge engineering. Upon completion of this course, students should have learned the analysis and design of bridge superstructures, foundations, bearings and deck joints.

COURSE OUTCOMES:

After completion of the course, students will be able to:

CO-1	Understand the basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality
CO-2	Understand the Hydraulic characteristics and Loads on bridges
CO-3	Design the slab culvert, Box culvert
CO-4	Design the T beam bridge
CO-5	Design and analysis of sub-structures i.e. abutments, piers, bearings and foundations of a bridge system

DETAILED SYLLABUS

Reinforced Concrete Bridges: Hydraulic Characteristics of bridge sites. IRC Loading and impact factors, Design and detailing of slab bridge, IRC effective width method, Design and detailing of simply supported T-beam bridge (without footpath) - Pigeaud's method for design of slab panels and Courbon's method of lateral distribution of live load in main beams, Design and detailing of single vent rectangular box culvert. Design of Piers and Abutments, Design of Bearing and Foundation design

Drawings: (For Class Work Evaluation only) Plan, Elevation and section of reinforced concrete slab, T Beam Bridge and Box Culvert with reinforcement details and bar bending schedule.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE PLAN: (BRIDGE ENGINEERING)

Sl. No.	Topic	No. of Hours
1	**Introduction:** · History of Bridges; Components of a Bridge and its definitions;. · Classification of Road Bridges, related structures, span length;. · Classical Examples of each type; People involved in the total process; History of Analysis; Approach of this book.	3
2	**Selection of Site and Initial Decision Process:** Survey and Alignment; Geotechnical Investigations and Interpretations. **River Bridge:** · Selection of Bridge site and planning; Collection of Bridge design data; Hydrological calculation. Waterway calculation; Scour calculation; Depth of foundation; Freeboard. **Road Bridge:** Selection of Bridge site and planning; Collection of Bridge design data; Vertical clearance.	5
3	**Standard Loading for Bridge Design as per different codes:** **Road Bridges:** · IRC, BS code, AASHTO code. Dead load, Live load, Impact factor, Centrifugal force;. · Wind loads, hydraulic forces, Longitudinal forces, Seismic forces; Earth pressure. · Buoyancy; Lane concept, equivalent loads, traffic load; Width of Roadway and Footway. · Influence lines for statically; determinate structures. I.L. for statically indeterminate structures. · Transverse distribution of Live loads among deck longitudinals. · Load combinations for different working state and limit state designs.	4
4	**Superstructures:** · Selection of main bridge parameters, design methodologies. · Choices of superstructure types; Orthotropic plate theory, load distribution techniques. · Grillage analysis; Finite element analysis (Preferable); Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge. · Slab bridge and voided slab bridge; Beam-Slab bridge; Box Girder Bridge. ***Transverse Analysis of Bridge:*** · Slab bridge and voided slab bridge.	15

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	· Beam-Slab bridge; Box Girder Bridge. *Temperature Analysis.* *Distortional Analysis.* *Effects of Differential settlement of supports.* *Reinforced earth structures.* ***Typical Details:*** · Slab Bridge. · Slab-Girder Bridge(Straight/Skew). · Box Girder Bridge (Straight/ Skew).	
5	**Substructure**: · Pier; Abutment; Wing walls; Importance of Soil-Structure Interaction; Types of foundations. · Open foundation; Pile foundation; Well foundation; Examples - Simply supported bridge, Continuous Bridge.	10
6	**Bearings and Deck Joints**: Different types of bridge bearings and expansion joints; Design of bearings and joints.	3
7	**Parapets and Railings for Highway Bridges**: Definitions; Classification of Highway Bridge parapets; Various Details.	2
	Total No. of Lectures	**42**

TEXT BOOKS:

1. Victor D.J - Essentials of bridge Engineering, Oxford and IBH Publishers.
2. S. PONNUSWAMY , "Bridge Engineering", TMH Publishing Company Limited
3. Arya and Azmani - Design of steel structures, Nemchand Publishers.
4. I.R.C Codes, Railway bridge rules, Lucknow

REFERENCE BOOKS:

1. Indian Road Congress codes.
2. Indian Highway Journals.
3. BS Codes.
4. AASHTO Codes.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Teaching Methodology and Evaluation Scheme:

The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions and presentations on relevant topics will be given.

Component	Duration	Marks	Constituents
Test - 1	1 hour	15	Theory + Numerical
Test - 2	1.5 hours	25	Theory + Numerical
Test - 3	2 hours	35	Theory + Numerical
Teacher's Assessment		25	Quizzes: 5 Classwork:10 Assignments: 10

Course Outcomes (COs) contribution to Programme Outcomes (POs)

Course Outcome (Bridge Engg.)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	2	3	2	2	2	1	x	x	1	3	3	3	**1.83**
CO2	2	3	3	3	2	1	2	2	2	3	3	1	**2.25**
CO3	3	1	2	1	3	x	x	x	2	2	1	3	**1.50**
CO4	3	3	3	3	3	x	3	2	2	2	3	3	**2.50**
CO5	3	3	2	2	2	1	x	x	2	3	3	1	**1.83**
Average	**2.60**	**2.60**	**2.40**	**2.20**	**2.40**	**0.60**	**1.00**	**0.80**	**1.80**	**2.60**	**2.60**	**2.20**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Business Analytics

COURSE CODE: 18B1WHS632

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand facets of business analytics within an organization.
2. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
3. To become familiar with the processes needed to develop, report, and analyze business data.
4. To analyze real world business problems, not only with the context of the company but also with the context of the society, with the help of modern concepts and tools and techniques of the concerned area.
5. To provide an optimal solution which benefits both the company and the society as a whole.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding the concepts and dimensions of business analytics	Familiarity
CO-2	Formulations of business analytics problems	Assessment
CO-3	Developing and reporting of the problems after proper assessment	Assessment
CO-4	Analyzing problems using different tools and techniques of business analytics	Usage
CO-5	Designing an optimal strategy to help the company	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction and importance to Business Analytics, Categorization of Analytical Methods and Models, Business Analytics in Practice – Marketing, HR, Finance etc.	3
2	**Business Analytics Models:** Overview and Deployment of Business Analytics Models	2
3	**Exploring Data:** Describing the distribution of single variable – Types of data, categorical variables etc,; Relationships among variables – categorical variables, categorical and numerical variables and numerical variables	6
4	**Probability and Decision Making:** Probability and distributions – single random variables; Distributions – normal, binomial, poisson and exponential; Decision making under uncertainty – elements of decision analysis, precision tree, Bayes' rule, multistage decision problems; Applications in Business Management	7
5	**Statistical Inference:** Sampling and sampling distributions; Confidence Interval Estimations; Hypothesis testing; Applications in Business Management	7
6	**Regression Analysis:** Regression Analysis – Estimation; Regression Analysis – Inference; Applications in Business Management	8
7	**Simulation Modeling:** Introduction to Simulation Modeling; Simulation Models – Operations, Financials, Marketing Applications in Business Management	9
Total lectures		42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Suggested Text Book(s):

1. S. Christian Albright and Wayne L. Winston: Business Analytics: Data Analysis and Decision Making, Cengage Learning, 5e

Suggested Reference Book(s):

1. Jeffrey D Camm et al.: Essentials of Business Analytics, Cengage Learning
2. Halady P: Business Analytics: An Application Focus, PHI
3. Seema Acharya and R. N. Prasad: Fundamentals of Business Analytics, Wiley

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Class Performance – 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Business Analytics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	2	2	2	2	1	2	1	2	3	1	2	1.67
CO-2	0	3	2	3	3	1	1	1	2	1	2	1	1.67
CO-3	0	2	1	1	1	1	1	0	0	1	1	1	0.83
CO-4	1	3	2	3	3	1	2	1	1	1	2	1	1.75
CO-5	0	1	3	3	3	1	1	1	1	1	1	1	1.42
Average	0.20	2.20	2.00	2.40	2.40	1.00	1.40	0.80	1.20	1.40	1.40	1.20	1.47

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Cloud Computing

COURSE CODE: 18B1WCI737

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Operating System

Course Objectives:

1. To demonstrate an understanding of cloud computing concepts and standards.
2. To understand all enabling technologies of Cloud computing.
3. To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
4. To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To understand different enabling technologies for Cloud computing environment.	Assessment
CO-3	To design Cloud computing data-center for effective utilization of available resources	Usage
CO-4	To study different managers related to Cloud computing services	Assessment
CO-5	To understand dofferent case studies of Cloud computing and its advance topics	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Understanding Cloud Computing:** Basic Concepts and terminology, Goals and Benefits. Risks and Challenges, Roles and boundaries, Cloud characteristics, Cluster Computing, Grid Computing, NIST Architecture, Cloud Deployment models, Cloud service models.	7
2	**Cloud Enabling Technologies:** Virtualization, Types of virtualization, Server Consolidation, virtualization management, Web Technology, Service, Oriented Architecture, Datacenter and Multi-tenancy	7
3	**Cloud Infrastructure Management:** Cloud datacenter design, Workloads and software infrastructure for a datacenter, Datacenter hardware, energy and power efficiency in a datacenter., Cloud usage monitor, Monitoring agent, Resource agent, Polling Agent	7
4	**Cloud Mechanisms:** Automated Scaling, Load Balancer, SLA Monitor, Failover System, Multi-Cloud Broker	7

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Fundamental Cloud Architectures:** workload distribution architecture, resource pooling architecture, dynamic scalability architecture, service load balancing architecture, cloud brusting architecture. Billing Management System Business cost metrics, cloud usage cost metrics,	7
6	Cloud service metrics., Cloud Security, Mobile cloud computing, Disaster recovery in cloud computing, Case studies	7
Total lectures		**42**

Suggested Text Book(s):

1. Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568
2. Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.

Suggested Reference Book(s):

1. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
2. The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
3. Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
4. The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
2. Link to topics related to course:
   i. https://www.edx.org/learn/cloud-computing
   ii. https://www.udemy.com/introduction-to-cloud-computing/

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Cloud Computing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	2	2	1	2	2	1	2	3	1.8
CO-2	3	2	1	2	2	2	1	2	2	1	3	2	1.9
CO-3	2	2	3	2	2	1	3	2	1	1	1	1	1.8
CO-4	2	2	3	2	2	1	3	2	1	1	1	1	1.8
CO-5	3	3	3	3	3	1	2	1	2	2	3	2	2.3
Average	2.6	2	2.2	2	2.2	1.4	2	1.8	1.6	1.2	2	1.8	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Molecular Evolution

15B1WBI834 **Elective Course**

Credits: 3

L 3 T 0 P 0

Pre-requisites: Basic knowledge of computational biology, evolutionary biology, functional genomics and various kind of graph theory basics and preliminary idea about other computational and mathematical methods used in biological data analysis.

Course Objectives (Learning Goal):

The objective of the course is to develop functional and evolutionary genomic understanding of biological entities for various kind of lineages for biological data types such as DNA, RNA, Genes, Proteins etc.

Course Assessment:

T-1 test	15
T-2 Test	25
T-3 Test	35
Teacher Assessment (Based on Assignments, quizzes etc.)	25
Total	100

Course Outcomes:

CO I: Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis

CO II: Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information

CO III: Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data

Topics covered:

Introduction to molecular evolution and its role in the regulation of various biological processes.

Introduction to evolutionary biology, functional genomics, basics of data types for biological

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

sequences their importance and applications in further analysis. Genes, operons, regulons, stimulons, genomes, proteins, proteomes etc. Patterns of base composition and codon usage, gene duplication, pseudogenes, orphan genes, gene gain and gene loss processes, overlapping and nested genes, exonization, intron and RNA editing, functional convergence, hypothetical proteins and their annotations. Various kind of mutations and selection pressure and related theories. Description of models, methods and algorithms that are most useful for analysing the ever-increasing supply of molecular sequence data, with a view to furthering our understanding of the evolution of genes, proteins, and genomes. Models of nucleotide substitution, models of amino acid and codon substitution, phylogeny reconstruction: Overview, Maximum Likelihood methods, Bayesian methods, comparison of methods and tests on trees, molecular clock and estimation of species divergence times, neutral and adaptive protein evolution, simulating molecular evolution.

Text and Reference books

1. Molecular Evolution
   by Dan Graur and Wen-Hsiung Li, Sinauer Associated Inc. Pub., USA
2. Computational Molecular Evolution
   by Ziheng Yang, Oxford Series in Ecology and Evolution
3. Molecular Evolution: A phylogenetic approach
   Rodric DM Page and Edward C Holmes, Blackwell Science Ltd.
4. Inferring Phylogenies
   J. Felsenstein, . Sinauer Associated Inc. Pub., USA
5. Molecular Evolution and Phylogenetics
   Masatoshi Nei and Sudhir Kumar, Oxford University Press
6. Bioinformatics and Molecular Evolution
   by Paul G Higgs, Blackwell Publishing

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Mapping of Course Outcomes and POs

	Course Outcomes	POs							
		1	2	3	4	5	6	7	Assessment (%)
CO-I	Able to understand the holistic approaches of molecular evolution combining acquisition, integration and management of experimental data with computer aided analysis	H	H	H	L	H	H	M	86
CO-II	Use various methods from computational genomics and proteomics to learn their functional aspects of controlling biological processes by incorporating evolutionary information	H	H	H	M	H	H	M	90
CO-III	Able to analyze various kind of biological sequence data and identify their limiting factors to propose new design principles for the analysis of biological data	H	H	H	M	H	H	H	95
	Assessment (%)	100	100	100	56	100	100	78	

Score 1 Low

Score 2 Medium

Score 3 High

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COMPUTER ANIMATION

COURSE CODE: XXXXXXXX

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 2-0-2

Description

This course investigates the theory, algorithms and techniques for describing and programming motion for animation worlds. Approaches that will be explored include key framing systems, kinematics, motion of articulated figures, and procedural and behavioral systems.

Pre-requisite: Computer Graphics, C

Course Objectives: Students will be able

- To learn the basic of animation
- To learn the fundamentals of key framing and interpolation.
- To understand the working of motion.
- To understand animating behavior and articulated figures.
- To learn the basic principles of motion capture and apply them to an animation application.
- To understand Human figure study through anatomy

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic of animation	Familiarity
CO-2	Able to learn the fundamentals of key framing and interpolation.	Assessment
CO-3	Understand the working of motion	Familiarity
CO-4	Demonstrate the skills for animating behavior and articulated figures	Assessment
CO-5	Able to learn the basic principles of motion capture	Assessment
CO-6	To develop animation application and facial recognition	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction-** Motion perception, Heritage of animation, Animation production, Computer animation production, History of computer animation, **Technical Background-** Spaces and transformations, Orientation representation	6
2	**Interpolating Values-** Interpolation, Controlling the motion of a point along a curve, Interpolation of orientations, Working with paths, **Interpolation-Based Animation-** Key-frame systems, Animation languages, Deforming objects, Three-dimensional shape interpolation, Morphing (two-dimensional)	8
3	**Kinematic Linkages-** Hierarchical modeling, Forward kinematics, Inverse kinematics, **Motion Capture-** Motion capture technologies, Processing the images, Camera calibration, Three-dimensional position reconstruction, Fitting to the skeleton, Output from motion capture systems, Manipulating motion capture data	8
4	**Physically Based Animation-** Basic physic, Spring animation examples, Particle systems, Rigid body simulation, Cloth, Enforcing soft and hard constraints, **Fluids-** Liquids and Gases: Specific fluid models, Computational fluid dynamics	6
5	**Modeling and Animating Human Figures-** Overview of virtual human representation, Reaching and grasping, Walking, Coverings, **Facial Animation:** Human face, Facial models, Animating the face, Lip-sync animation	8
6	**Behavioral Animation-** Primitive behaviors, Knowledge of Environment, Modeling intelligent behavior, Crowds, **Special Models for Animation-** Implicit surfaces, Plants, Subdivision surfaces	6
Total lectures		**42**

Text Book

- Computer Animation: Algorithms and Techniques, 3rd Edition, by Rick Parent (Morgan Kauffmann, 2012), ISBN: 0124158420

Reference Books

- Foundations of Physically Based Modeling & Animation by Donald H. House and John C. Keyser CRC Press, 2016, ISBN: 9781482234602
- Physics for Game Developers by David M. Bourg, O'Reilly, 2002, ISBN: 0596000065

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	
Average													

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COMPUTER ANIMATION LAB

COURSE CODE: XXX **COURSE CREDITS:** 1 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 0-0-2

Description

The students will discover the fundamental principles of animation & exploit these fundamental principles to create convincing character motion.

Course Objectives: Students will be able

1. To learn the basic tool of animation
2. To learn the fundamentals of sketching and drawing.
3. To learn the design of animation character.
4. To develop an animation application

Course Outcomes

S No	Course Outcomes	Level of Attainment
CO-1	Capable to work with basic Animator Drawing Tool	Familiarity
CO-2	Demonstrate the skills for sketching and drawing.	Assessment
CO-3	Capable to develop animation character	Assessment
CO-4	Capable to develop animation application	Usage

List of Experiments

S No	Experiment	Hours
1	**Using Animator's Drawing Tools** The Animation Table (lightbox), Field charts, Line Testing Camera, Peg bar, Punching Machine	4
2	**Sketching and Drawing** Drawing for Animation, Exercises and Warm-ups on Pegging Sheet, Quick studies from real life, sequential movement drawing, Caricaturing the action, thumbnails drawing for motion	8
3	**Developing an Animation Character** Incorporating various moods and shades of a character Various gestures and facial expressions of the character	8
4	**Anatomy and Body Language** Front, side and back view of the character, Anatomy and Body Language of the character Caricaturing the character	8
	Total Lab Hours	28

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Textbook

- The complete animation course by Chris Patmore Pub.-Baron's Educational Series (New York)

Reference book

- Animation Unleashed by Ellen Bessen, Michael Weise Productions Pub.2008 (U.S.A)
- The Animator's Survival Kit by Richard Williams, Arrar Straus & Giroux Pub.(U.S.A)

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5	Attendance and discipline in lab		15
6	Total		100

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Avg
CO-1	1	1		2	1	3	1	1		2	1		1.4
CO-2	2	1	2			2		2		3	2	1	1.9
CO-3	3	2	3		2		2	3			3		2.6
CO-4		1	2	1	3			1	3	2	1	2	1.8
Avg	2	1.3	2.3	1.5	2	2.5	1.5	1.8	3	2.3	1.8	1.5	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computer Vision

Course Code: 18B1WCI840
Course Credits: 3-0-0
Instructor: Mr. Surjeet Singh
OE for B Tech 8th Sem CSE/IT

Course Outcomes(COs):

Sr No	Course Outcomes (Computer Vision)	Level of Attainment
CO-1	To understand the concepts of digital image processing	Familiarity
CO-2	To understand the concepts of depth estimation and Multi-camera views	Assessment
CO-3	To understand the concepts of Feature Extraction	Assessment
CO-4	To understand the concepts of Image Segmentation	Assessment
CO-5	To understand the concepts of Pattern Analysis	Usage
CO-6	To understand the concepts of Motion Analysis	Assessment
CO-7	To understand the concepts of Shape formation	Usage

Course Outline:

Modules	Contents	Lectures required
Module 1	UNIT - I- Digital Image Formation and low-level processing Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing	5
Module 2	UNIT-II- Depth estimation and Multi-camera views Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration	7
Module 3	UNIT-III- Feature Extraction Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.	6
Module 4	UNIT-IV- Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection	7
Module 5	UNIT-V- Pattern Analysis Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised;	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods	
Module 6	UNIT-VI- Motion Analysis Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation	8
Module 7	UNIT-VII- Shape from X Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges	4

CO-PO Articulation (Computer Vision)													
Sr No	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	Weightage
CO-1	3	3	3	2	3	3	2	2	2	2	2	3	60%
CO-2	3	3	3	2	2	2	2	2	2	2	2	3	77%
CO-3	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-4	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-5	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	3	3	3	3	3	3	3	3	3	70%
Weightage	100 %	100 %	100 %	70 %	80 %	90 %	60 %	80 %	100 %	70 %	80 %	100 %	

CO- PSOs Articulation					
Sr No	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	
CO-1	3	2	2	2	**79**
CO-2	2	3	2	3	**79**
CO-3	3	2	3	2	**81**
CO-4	2	2	2	2	**75**
CO-5	2	3	2	3	**79**
CO-6	3	2	3	2	**79**
Average Score	**81**	**82**	**85**	**76**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Construction Management Computations

COURSE CODE: 18B1WCE641

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 1-0-4

Pre-requisite: Individuals with knowledge of project management principles and hands-on experience with Windows operating system are the ideal participants for this course.

Course Objectives:

1. Create a project
2. Create a Work Breakdown Structure
3. Create Relationships
4. Schedule the project
5. Analyze resources and cost
6. Execute the project
7. Manage risk

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn To Create a project	Assessment
CO-2	Learn To add activities and Create relationships	Assessment
CO-3	Learn To Assign and analyze resources and Analyze project performance	Assessment
CO-4	Learn To Execute and control the project	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures
1	**Overview and Configuration :** Project Management Life Cycle, Understanding Data in P6, Overview and Navigation	2
2	**Structuring Projects :** Creating a Project, Creating a Work Breakdown Structure, Adding Activities, Calendars, Creating Relationships, Scheduling, Assigning Constraints	4
3	**Implementing the Schedule :** Assigning Constraints, Customizing Activity Views, Understanding Roles and Resources, Assigning Roles and Resources, Project Workspace	4
4	**Updating and Managing the Schedule :** Optimizing the Project Plan, Baselining the Project Plan, Methods of Applying Progress, Executing the Project Plan, Analyzing the Updated Project, Portfolios and Dashboards	4
Total lectures		**14**

List of Experiments:

Sr. no.	Description	Hours
1	Introduction to software Understanding Data in P6 and Overview and Navigation	2
2	How to Create a Project and create a Work Breakdown Structure	3
3	Adding Activities, Calendars and Creating Relationships in Primavera	2
4	Scheduling and Assigning Constraints in Primavera	2
5	How to Assign Constraints, Customize Activity Views and Assign Roles and Resources	3
6	Methods of Applying Progress and Executing the Project Plan in Primavera	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Kumar Niraj Jha, "Construction project management: Theory and Practices"
2. Punamia & Khandelwal, "CPM and PERT".

Other useful resource(s):

1. nptel.ac.in/

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	2	3	2	1	2	2	1	3	3	1	3	**2.16**
CO2	3	2	3	3	3	2	2	2	3	2	2	3	**2.5**
CO3	2	2	2	2	1	2	3	2	2	2	2	3	**2.08**
CO4	2	2	3	2	1	2	2	1	2	1	2	2	**1.83**
Average	**2.5**	**2**	**2.75**	**2.25**	**1.5**	**2**	**2.25**	**1.5**	**2.5**	**2**	**1.75**	**2.75**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CONTEMPORARY INDIA IN GLOBALIZED ERA: CHALLENGES OF DEMOCRACY AND DEVELOPMENT

COURSE CODE: 18B1WHS831

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.
2. The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.
3. The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.
4. The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The course introduces students to contemporary India with special focus on challenges of democracy and development and main vectors that are moulding India's course in today's globalised era.	Familiarity
CO-2	The course begins with an overview of India's emergence from colonial trappings and its progression in past decades to acclaim a global stature in world affairs.	Familiarity
CO-3	The course deliberates on major issues of Indian foreign policy, especially the problematic of peace and security in the globalised world.	Familiarity
CO-4	The overall aim of the course is to develop a broad and yet nuanced understanding of prospects and challenges of contemporary India in the twenty-first century.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Contextualising Modern India:** Overarching visions of India's national movement: domestic and international, Challenges of nation-building within its domestic contours, Continuities and shifts in Indian polity and society, Rising aspirations and constraints in post Globalized era, Digitising India: Prospects and Challenges	10
2	**India in World Affairs:**Gandhi-Nehru Legacy and policy of nonalignment: Formative Years, Post-Cold war challenges and changing global configurations, India's growing role in world affairs: soft power capacity, diaspora, major bilateral,	15

Assistant Registrar
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	regional and global concerns and aspirations, India and Major Powers, India and its neighbours, India and Brics	
3	**India's security concerns:** External Threats: China and Pakistan,Internal Threats: Kashmir and Northeast, Spectre of Terrorism	9
4	**Non-traditional Security:** Human Security Concerns, Energy Security, Water and Food Security, Health and Safety	6
5	**Challenges ahead:** India has had a phenomenal rise in terms of economic growth, technical knowhow, and has performed well on various other parameters. Nonetheless there are severe constraints to its unfolding. This topic will cover some of the challenges that India is facing today and the measures it is taking to overcome them.	2
Total lectures		42

Suggested Text Book(s):

1. Tharoor, Shashi. 'India: From Midnight to the Millennium'
2. Wajid Ali, H.M. 'India and the Non-aligned Movement'
3. Budhania, Rajpal. 'India's National Security Dilemma'
4. Asthana, Vandana. Shukla, A.C. 'Water Security in India'

Suggested Reference Book(s):

1. Candra Bipin, 'Freedom Struggle'
2. Ram Chandra Guha, 'India after Gandhi'
3. Tharoor, Shashi. 'India: From Midnight to the Millennium'
4. Chandra, Bipan. 'India since Independence'
5. Sen, Amartya. 'Development as Freedom'
6. Ninan Thomas,Pradeep. 'Digital India: Understanding Information, Communication and Social Change'
7. Menon, Shivshankar. 'Choices: Inside the Making of Indian Foreign Policy'
8. Wajid Ali, H.M. 'India and the Non-aligned Movement'
9. Mandrup, Thomas. 'The BRICS and Coexistance'
10. Sikri, Rajiv. 'Challenge and Strategies: Rethinking India's Foreign Policy'
11. P. Bajpai, Kanti. Pant, Harsh.V. 'India's National Security'.
12. Budhania, Rajpal. 'India's National Security Dilemma'
13. Sondhi. M.L. 'Nuclear Weapons and India's National Security'
14. Centre for Strategic Studies - 'Energy Security Challenges: Non Traditional Security Planning in India'
15. Asthana, Vandana. Shukla, A.C. 'Water Security in India'
16. Kolas, Ashild and Miklian, Jason. 'India's Human Security: Lost Debates, Forgotten
17. People, Intractable Challenges'.
18. Venkateshwar, Sita. 'Globalisation and the Challenges of Development in Contemporary India'

Other useful resource(s):

1. https://www.goodreads.com/book/show/356824.India_After_Gandhi
2. https://www.springer.com/in/book/9789811004537
3. https://www.academia.edu/35220477/NonAligned_Movement_A_Historic_Movement_reinventing_itself_for_Future_NonAligned_Movement_A_Historic_Movement_reinvening_itself_for_Future
4. https://www.routledge.com/Indias-Human-Security-Lost-Debates-Forgotten-People-Intractable-Challenges/Miklian Kolas/p/book/9780415830683

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 25.10.2018

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Report writing (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Contemporary India in Globalized era: Challenges of Democracy and development)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	2	2	3	3	3	3	3	0	3	2.7
CO-2	0	3	0	2	2	3	3	3	2	3	0	3	2.6
CO-3	0	2	0	2	3	3	3	3	2	3	0	3	2.6
CO-4	0	0	0	2	2	3	3	3	2	3	0	3	2.6
Average	0	2.5	3	2	2.2	3	3	3	2.2	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

18B1WCI635 Data Mining & Data Warehousing

Course Credit: 3

Semester: VI

Introduction:

Data mining is an interdisciplinary subject, and more appropriately named "knowledge mining from data". However, it is also known as knowledge discovery from data (KDD).

Course Objectives (Post-conditions) Knowledge objectives:

- Good knowledge to Mine Data from Large Amount of Data Sources
- You will be able to compare a two different data set and you can find out which one is better
- You will be able to apply many retrieval techniques on a given document
- You will be able apply some pattern matching algorithm and map the various expected pattern depend upon usage requirements

Application objectives:

Data Mining and Information Retrieval have tremendous advantages in term of their application areas which include; Financial Data Analysis, Retail and Telecommunication Industries, Intrusion Detection and Prevention, Bioinformatics and many more.

Expected Student Background (Preconditions)

Database Management Concepts, Probability and Basic Mathematical Concepts

Topics Outline:

Serial No.	Topics	Hrs
1	Introduction to Data Mining	3
2	Data Preprocessing	5
3	Data Generalization, Data Warehousing, and On-line Analytical Processing	8
4	Association Rule Mining and Frequent Patterns	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

5	Classification and Prediction	8
6	Cluster Analysis	8
7	Outlier Detection	4
		Total Hours = 42

Text Book(s):

1. Jiawei Han and Micheline Kamber, "Data Mining, Concepts and Techniques", Elsevier 2nd edition.
2. An introduction to Information Retrieval, 2008 Cambridge UP.
3. Thomas H. Corman, Charles E. Leiserson, and Ronald L. Rivest, Introduction to Algorithms,. The MIT Press,England, 1989.

Reference Book(s):

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining ", Pearson Education.
2. Richard O. Duda, Peter E. Hart, David G. Stork , "Pattern Classification", 2nd Edition, Wiley Publication, November 2000.
3. Rijsbergen C. J. ,"Information Retrieval" 2nd edition.

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	INTERNAL	25
		Total Marks: 100

Internal Marks Breakdown:

Assignments: 9 marks (3x3)
Quizzes: 12 marks (3x4)
Regularity: 4 Marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Warehouse and Data Mining Lab

COURSE CODE: 18B1WCI675

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: Introduction to Programming

Course Objectives:

1. Practical exposure on implementation of well known data mining tasks.
2. Exposure to real life data sets for analysis and prediction.
3. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
4. Handling a small data mining project for a given practical domain.
5. Develop and apply enthusiasm for learning machine learning tools and techniques.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Practical exposure on implementation of well known data mining tasks.	Familiarity
CO-2	Exposure to real life data sets for analysis and prediction.	Technical skills
CO-3	Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.	Computational skills
CO-4	Handling a small data mining project for a given practical domain.	Computational
CO-5	Develop and apply machine learning tools and techniques.	Assessment

List of Experiments:

S. No.	Description	Hours
1	Introduction to Rapid Miner Studio, Weka and R	2
2	Creation of a Data Warehouse in Rapid Miner	2
3	Apriori Algorithm	4
4	FP-Growth Algorithm	4
5	K-means Clustering, K-Means ++ Clustering	4
6	Hierarchical clustering algorithm	4
7	Bayesian Classification	2
8	Decision Tree	2
9	Feature Reduction using PCA	2
10	Model Examination	2
Total Lab hours		**28**

Suggested Books/Resources:

1. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7, 2006
2. Mininig Massive data sets Anand Rajaram, Jure Leskovec and Jeff Ullman Cambridge University Press
3. Data Mining Concepts and Techniques J. Han and M. Kamber Morgan Kaufmann, 2006, ISBN 1-55860-901-6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4. An Introduction to Information Retrieval, 2008 Cambridge UP.
5. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
6. https://www.coursera.org/specializations/data-mining
7. https://www.futurelearn.com/courses/data-mining-with-weka
8. https://docs.rapidminer.com/
9. https://archive.ics.uci.edu/ml/datasets.html
10. IRIS dataset: http://archive.ics.uci.edu/ml/datasets/Iris
11. Mushroom dataset: http://archive.ics.uci.edu/ml/datasets/Mushroom
12. Breast cancer dataset: http://archive.ics.uci.edu/ml/datasets/Breast+Cancer
13. Car evaluation dataset: http://archive.ics.uci.edu/ml/datasets/Car+Evaluatio

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	3	1	2	2	2	2	2	2	1	1	2	1.9
CO-2	3	3	3	3	3	3	2	3	3	1	1	3	2.6
CO-3	3	3	3	3	2	3	1	2	3	2	3	3	2.6
CO-4	3	1	2	1	2	1	1	2	1	1	1	2	1.5
CO-5	3	3	3	3	2	3	1	2	3	2	3	3	2.6
Average	3	2.6	2.4	2.4	2.2	2.4	1.4	2.2	2.4	1.4	1.8	2.6	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Science Using Python

COURSE CODE:
COURSE CREDITS: 3
CORE/ELECTIVE: ELECTIVE
L-T-P: 3-0-0

Pre-requisite: Basic knowledge of high school mathematics and reasonable programming experience.

Course Objectives:

- Asking the correct questions and analyzing the raw data.
- Modelling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and find the final result.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understanding the basics of data science	Familiarity
CO-2	Using versatile and flexible languages (Python) for supporting data science	Usage
CO-3	Using data processing for collecting and manipulating the data into the usable and desired form	Usage
CO-4	Using data visualization to easily access the huge amount of data in visuals	Usage
CO-5	Using statistics to collect and analyze the numerical data in a large amount and finding meaningful insights from it.	Usage
CO-6	Understanding linear algebra to represent, model, synthesize and summarize the complex data.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Data Science an Introduction:** Computer Science, Data Science, and Real Science, What is Data Science? Need for Data Science, Data Science Components, Tools for Data Science, Data Science Lifecycle, Applications of Data Science	6
2	**Python Programming for Data Science:** Introduction to Python Programming (Python Basics, Python Data Structures, Python Programming Fundamentals, Working with Data in Python, Working with NumPy, Pandas, SciPy, and Matplotlib).	14

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Data Processing:** Data Operations, Data cleansing, Processing CSV Data, Processing JSON Data, Processing XLS Data, Relational databases, NoSQL Databases, Date and Time, Data Wrangling, Data Aggregation, Reading HTML Pages, Processing Unstructured Data, Word tokenization, Stemming and Lemmatization	6
4	**Statistical Data Analysis:** Measuring Central Tendency, Measuring Variance, Normal Distribution, Binomial Distribution, Poisson Distribution, Bernoulli Distribution, P-Value, Correlation, Chi-square Test, Linear Regression	5
5	**Linear Algebra:** Visualizing Matrix Operations (Matrix Addition, Matrix Multiplication, Applications of Matrix Multiplication, Identity Matrices and Inversion, Matrix Inversion and Linear Systems, Matrix Rank) Factoring Matrices (Why Factor Feature Matrices, LU Decomposition, and Determinants), Eigenvalues and Eigenvectors (Properties of Eigenvalues, Computing Eigenvalues), Eigenvalue Decomposition (Singular Value Decomposition, Principal Components Analysis)	5
6	**Data Visualization:** Chart Properties, Chart Styling, Box Plots, Heat Maps, Scatter Plots, Bubble Charts, 3D Charts, Time Series, Geographical Data, Graph Data	6
	Total Lecture Hours	42

Suggested Text Book(s):

- Data Science from Scratch by Joel Grus
- Data Science for Dummies by Lillian Pierson and Jake Porway
- An Introduction to Statistical Learning by Gareth James, Daniela Witten, et al.

Reference Book(s):

- An Introduction to Probability and Statistics by V.K. Rohatgi & A.K. Md. E. Saleh, Wiley, (2008), 3rd ed.
- Introduction to Probability Theory and Statistical Inference by H.J. Larson, John Wiley & Sons, (2005) 3rd ed.

Other useful resources (s):

- https://nptel.ac.in/courses/110/106/110106064/
- https://onlinecourses.nptel.ac.in/noc18_cs28/preview

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching	25	Entire Semester	Assignment (2) - 10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Assessment			Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Science Using Python)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	1	1	1	3	2	2	1	1.8
CO-2	3	3	3	3	3	1	1	2	2	2	1	1	2.1
CO-3	2	2	2	2	1	1	2	2	2	2	1	2	1.8
CO-4	3	3	3	3	2	1	1	3	2	3	3	2	2.4
CO-5	3	2	3	3	1	1	2	1	1	3	2	1	1.9
CO-6	2	2	1	2	2	2	3	2	1	2	3	1	1.9
Average	2.5	2.3	2.3	2.7	1.8	1.2	1.7	1.8	1.8	2.3	2	1.3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Datawarehousing and Mining for Bioinformatics

COURSE

CODE:18B

1WBI632

COURSE

CREDITS:

3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Biochemistry

Course Objectives:

1. Learn to develop and use datawarehouse
2. Learn feature selection methods
3. Learn methods for data mining.
4. Apply data mining techniques in biological datasets.
5. Learn and apply cross-validation.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will have a thorough understanding of various datawarehousing components and architecture.	Familiarity
CO-2	Students will understand various types of data models.	Assessment
CO-3	Students will understand how to perform feature selection and derive association rules	Assessment
CO-4	Students will understand how to perform various types of data mining, including clustering, neural networks etc.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Knowledge Discovery Process -** Understanding the business intelligence cycle	2
2	**Introduction to Data warehousing** – Components of data warehouse, Architecture, lifecycle & related core terms.	2
3	**Types of Data warehouse design methodologies** – Top Down Approach, Bottom Down approach, Hybrid design Approach	3
4	**Data Models** - Dimensional Data Modeling (Star Schema, Snowflake Schema); Relational Data Modeling; Conceptual, Physical & Logical Data Model.	3
5	**Multidimensional Analysis** – OLAP & OLTP Approaches	2
6	**Building & Maintaining the data warehouse** – ETL design & development;	2
7	**Introduction to Data Mining** - concepts and techniques for the discovery of patterns hidden in large data sets	2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

8	**Grouping of data** - Classification and Clustering Methods; Decision Tree, Neural Network, Nearest Neighbor, Genetic Algorithm	7
9	**Feature Selection Methods** - Wrapper & Filter Approach, Correlation analysis,PCA	7
10	**Association Rule Learning Based Methods** - Apriori Algorithm	7
11	**Statistical techniques involved in data mining** – regression based model development	1
12	**Cross Validation Techniques** - Jackkniffing, Bootstrapping, Sensitivity, Specifcity, Accuracy	2
	Total Number of Lectures	42

Suggested Text Book(s):

a. Kimball, R., Margy, R. : The Data Warehouse Toolkit, 2nd Edition: The Complete Guide to Dimensional Modeling, John Wiley &SonsMolecular Biology of the Gene (1987) Watson J. D., Hopking N., Robast J. and Steiz, J.

b. Inmon, B. :Building the Data Warehouse, John Wiley & Sons.

Suggested Reference Books(s):

1. Pei, Han and Kamber, Data mining: Concepts and techniques third edition, Elsevier, 2011
2. Data Mining: Practical Machine Learning Tools and TechniquesKim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE,
3. Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2016

Other useful resource(s):

a. Link to NPTEL course contents:https://onlinecourses.nptel.ac.in/noc18_cs14/preview

b. Link to topics related tocourse:

iv. https://nptel.ac.in/courses/102104063

v. https://nptel.ac.in/courses/102106069/

vi. https://nptel.ac.in/courses/102106026/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course outcomes (Datawarehousing and Mining for BI)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	1.9
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	1.75
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	1.7
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	1.7
Average	2.0	2.0	2	2	2	1.25	1.25	1.5	2.0	2	1.33	2.0	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Digital Forensics

COURSE CODE: XXXXXXXX
COURSE CREDITS: 2
CORE/ELECTIVE: ELECTIVE
L-T-P: 2-0-0
Pre-requisite: Cryptography and Security, Computer Networks

Course Objectives:

1. To understand underlying principles and many of the techniques associated with digital forensic practices and cybercrime
2. To explore practical knowledge about ethical hacking Methodology.
3. To learn the importance of evidence handling and storage for various devices
4. To develop an excellent understanding of current cybersecurity issues (Computer Security Incident) and analyzed the ways that exploit insecurities.
5. To investigate attacks, IDS .technical exploits and router attacks and "Trap and Trace" computer networks.
6. To apply digital forensic knowledge to use computer forensic tools and investigation report writing

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Introduction to Cyber Crime and Ethical Hacking	Familiarity
CO-2	Introduction to Digital Forensics and Digital Evidences	Familiarity
CO-3	Computer Security Incident Response Methodology	Assessment
CO-4	Forensic Duplication and Disk Analysis, and Investigation Data Analysis	Assessment
CO-5	Network Forensics Incidents, Using Routers as Response Tools	Usage
CO-6	Forensic Investigation Report and Forensic Tools	Usage

Course Contents:

Unit	Contents	Lectures Required
1	Introduction of Cybercrime: Types of cybercrime, categories of cybercrime, Computers' roles in crimes, Prevention from Cybercrime, Hackers, Crackers, Phreakers Ethical Hacking: Difference between Hacking and Ethical hacking: Steps of Ethical Hacking, Exploring some tools for ethical hacking: reconnaissance tools, scanning tools	5
2	Digital Forensic, Rules for Digital Forensic The Need for Digital Forensics, Types of Digital Forensics, Ethics in Digital Forensics,	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT

	Digital Evidences: Types and characteristics and challenges for Evidence Handling	
3	Introduction to Computer Security Incident Goals of Incident Response, Incident Response Methodology, Formulating Response Strategy, IR Process – Initial Response, Investigation, Remediation, Tracking of Significant, Investigative Information, Reporting Pre Incident Preparation, Incident Detection, and Characterization. Live Data Collection: Live Data Collection on Microsoft Windows Systems: Live Data Collection on Unix-based Systems	5
4	Forensic Duplication Forensic Image Formats, Traditional Duplication, Live System Duplication, Forensic Duplication tools Disk and File System Analysis: Media Analysis Concepts, File System Abstraction Model The Sleuth Kit: Installing the Sleuth Kit, Sleuth Kit Tools Partitioning and Disk Layouts: Partition Identification and Recovery, Redundant Array of Inexpensive Disks Special Containers: Virtual Machine Disk Images, Forensic Containers Hashing, Carving: Foremost, Forensic Imaging: Deleted Data, File Slack, Data Analysis, Analysis Methodology Investigating Windows systems, Investigating UNIX systems, Investigating Applications, Web Browsers, Email, Malware Handling: Static and Dynamic Analysis	5
5	Technical Exploits and Password Cracking, Introduction to Intrusion Detection systems, Types of IDS Understanding Network intrusion and attacks, Analyzing Network Traffic, Collecting Network-based evidence, Evidence Handling. Investigating Routers, Handling Router Table Manipulation Incidents, Using Routers as Response Tools	4
6	Report: Goals of Report, Layout of an Investigative Report, Guidelines for Writing a Report, sample for writing a forensic report. Computer Forensic Tools: need and types of computer forensic tools, tasks performed by computer forensic tools. Study of open-source Tools like SFIT, Autopsy, etc. to acquire, search, analyze and store digital evidence	4
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Jason Luttgens, Matthew Pepe, Kevin Mandia, "Incident Response and computer forensics",3rd Edition Tata McGraw Hill, 2014.
- Nilakshi Jain, Dhananjay Kalbande, "Digital Forensic: The fascinating world of Digital Evidences " Wiley India Pvt Ltd 2017.
- Cory Altheide, Harlan Carvey "Digital forensics with open source tools "Syngress Publishing, Inc. 2011.
- Chris McNab, Network Security Assessment, By O'Reilly.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

- Clint P Garrison "Digital Forensics for Network, Internet, and Cloud Computing A forensic evidence guide for moving targets and data , Syngress Publishing, Inc. 2010
- Bill Nelson,Amelia Phillips,Christopher Steuart, "Guide to Computer Forensics and Investigations" . Cengage Learning. 2014
- Debra Littlejohn Shinder Michael Cross "Scene of the Cybercrime: Computer Forensics Handbook", 2nd Edition Syngress Publishing, Inc.2008.
- Marjie T. Britz, Computer Forensics and Cyber Crime, Pearson, Third Edition.

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-6	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Digital Forensics Lab

COURSE CODE: XXXXXXXX
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2
Pre-requisite: Cryptography and Security, Computer Networks

Course Objectives:

1. To understand underlying principles and many of the techniques associated with digital forensic practices and cybercrime
2. To explore practical knowledge about ethical hacking Methodology.
3. To learn the importance of evidence handling and storage for various devices
4. To develop an excellent understanding of current cybersecurity issues (Computer Security Incident) and analyzed the ways that exploit insecurities.
5. To investigate attacks, IDS .technical exploits and router attacks and "Trap and Trace" computer networks.
6. To apply digital forensic knowledge to use computer forensic tools and investigation report writing

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Introduction to Cyber Crime and Ethical Hacking	Familiarity
CO-2	Introduction to Digital Forensics and Digital Evidences	Familiarity
CO-3	Computer Security Incident Response Methodology	Assessment
CO-4	Forensic Duplication and Disk Analysis, and Investigation Data Analysis	Assessment
CO-5	Network Forensics Incidents, Using Routers as Response Tools	Usage
CO-6	Forensic Investigation Report and Forensic Tools	Usage

Course Contents:

Unit	Contents	Hours
1	Use a Web Search Engine, and search for companies specializing in computer forensics. Select three and write a two-to-three paper comparing what each company does.	2
2	Search the internet for articles on computer crime prosecutions. Find at least two. Write one or two pages summarizing the two articles and identify the key features of the decisions you find in your search.	2
3	Using a search engine, search for various computer forensics tools.	2
4	Preparing and processing of investigations. Try to examine and identify the evidence from the drives.	2
5	Extracting of files that have been deleted.	2
6	Illustrate any data acquisition method and validate it. Use an open-source	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

	data acquisition tool.	
7	You're investigating an internal policy violation when you find an e-mail about a serious assault for which a police report needs to be filed. What should you do? Write a two-page paper specifying who in your company you need to talk to first and what evidence must be turned over to police.	2
8	Create a file on a USB drive and calculate its hash value using FTK Imager. Change the file and calculate the hash value again to compare the files.	2
9	Compare two files created in Microsoft office to determine whether the files are different at the hexadecimal level. Keep a log of what you find.	2
10	Illustrate the analysis of forensics data.	2
11	Illustrate the validating of forensics data.	2
12	Locate and extract (JPEG) files with altered extensions.	2
13	Examine an E-mail message.	2
14	Investigate an E-mail message.	2
	Total Lab Hours	**28**

Suggested Text Book(s):

- "Computer Forensics and Investigations", Nelson, Phillips Enfinger, Steuart, Cengage Learning.

Suggested Reference Book(s):

- Brian Carrier, "File System Forensic Analysis" , Addison Wesley, 2005
- Dan Farmer & Wietse Venema ,"Forensic Discovery", Addison Wesley, 2005
- Eoghan Casey , —Digital Evidence and Computer Crime —, Edition 3, Academic Press, 2011
- Chris Pogue, Cory Altheide, Todd Haverkos ,Unix and Linux Forensic Analysis DVD ToolKit, Syngress Inc. , 2008
- Harlan Carvey ,Windows Forensic Analysis DVD Toolkit, Edition 2, Syngress Inc. , 2009
- Harlan Carvey ,Windows Registry Forensics: Advanced Digital Forensic Analysis of the Windows
- Registry , Syngress Inc, Feb 2011
- Eoghan Casey, Handbook of Digital Forensics and Investigation, Academic Press, 2009
- M Sonka, V Hlavac and R Boyle, Image Processing, Analysis and Machine Vision, PWS
- Pratt.W.K., Digital Image Processing, John Wiley and Sons, New York, 1978

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Project-1	10 Marks
4	Lab Assessment	45 Marks
5	Lab Attendance	5 Marks
	Total	100 marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-6	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Fundamentals of Digital Image Processing

COURSE CODE: 18B1WEC536

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms for basic and advanced image analysis
3. Assess the performance of image processing algorithms and systems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Analyze general terminology of digital image processing.	Familiarity
CO-2	Examine various types of images, intensity transformations and spatial filtering.	Familiarity
CO-3	Develop Fourier transform for image processing in frequency domain.	Assessment
CO-4	Evaluate the methodologies for image segmentation, restoration etc.	Usage
CO-5	Implement image process and analysis algorithms.	Usage
CO-6	Apply image processing algorithms in practical applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Digital Image Fundamentals: Introduction, Image sensing and acquisition, Image Sampling and quantization, Spatial and Gray level resolution, Zooming and Shrinking, Relationships between pixels, Linear and Nonlinear operations.	7
2	Image Enhancement in the Spatial Domain: Gray Level Transformation, Histogram Processing Techniques, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters.	8
3	Image Enhancement in the Frequency Domain: Properties of frequency domain, two dimensional Fourier Transform and its properties, Correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	6
4	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	6
5	Image Compression: Fundamentals of image compression, Image compression models, Variable length coding, Huffman coding, Near optimal variable length coding, Arithmetic coding, Constant area coding, Run length coding, Image compression standards (JPEG, JPEG2000).	7
6	Image Segmentation: Detection of discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation.	8
Total lectures		42

Suggested Text Book(s):

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", fourth Edition, Pearson Education, 2018.

Suggested Reference Book(s):

1. Anil K. Jain, "Fundamentals of Digital Image Processing", First Edition, PHI Learning Pvt. Ltd, 2015.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. Willliam K Pratt, "Digital Image Processing", Fourth Edition, John Willey, 2007.
3. S.Sridhar, "Digital Image Processing", Second Edition, Oxford University Press, 2016
4. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Fundamentals of Digital Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	1	1	2	2	2	2	1.92
CO-2	3	3	3	3	3	1	1	1	2	2	1	2	1.08
CO-3	3	2	2	2	3	2	1	1	2	2	1	2	1.92
CO-4	3	3	3	3	2	1	1	1	2	3	2	2	2.17
CO-5	3	3	2	3	2	2	2	2	2	3	3	2	2.42
CO-6	3	2	3	3	2	2	2	1	2	2	3	2	2.00
Average	3.00	2.50	2.50	2.67	2.3	1.67	1.33	1.17	2.00	2.33	2.00	2.00	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Digital Image Processing Lab

COURSE CODE: 18B1WCI676

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Introduction to various image processing techniques.
2. Implementing the basics of Image fundamentals, describing the main characteristics of digital images and how they are represented.
3. Learning and implementing mathematical transforms such as such as Fourier, Cosine transforms Singular value decomposition.
4. Implementing the concepts of 2D Wavelet transform, image enhancement techniques, Image restoration and denoising, segmentation.
5. Discussing and implementing the concepts of lossy and lossless data compression algorithms, binary and color image processing.

Course Outcomes :

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in digital Image Processing.	Familiarity
CO-2	To learn about image transformation techniques and issues related to image transformation.	Assessment
CO-3	To learn the basic techniques for Image Compression	Assessment
CO-4	To learn about enhancing images through techniques like filtering and equalization	Assessment
CO-5	To learn about image restoration, segmentation and denoising.	Assessment
CO-6	To implement graph theory in vector space models and colouring methodologies for images in MATLAB	Usage
CO-7	To understand image processing techniques" case studies	Familiarity

List of Experiments:

S. No	Description	Hours
1	Implementing images colorizations	1
2	Implement various techniques for quantization	1
3	Implement filtering techniques	1
4	Transform images using Laplacian	2
5	Decompose images using cosine, discrete transformation	1
6	Implementing lossless compression techniques	2
7	Implementing Lossy compression methods	1
8	Implementing image enhancement using filtering	2
9	Implementing image enhancement using spatial domains	1
10	Implementing image enhancement using equalization techniques	2
11	Implementing enhancements using mean, median, geometric mean, harmonic mean	2
12	Implementing Contraharmonic mean filters, Homomorphic filtering	2
13	Implementing image restoration techniques	1
14	Implementing denoising techniques	1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

15	Implementing Boundary detection based techniques	2
16	Implementing Edge detection based techniques	2
17	Implement Hough transform, Thresholding, Iterative thresholding	2
18	Implement Multivariable thresholding	2
Total Lab hours		**28**

Minor Project(s) – (Only for 2 credit lab)

1. Image Enhancement using Filtering Techniques.
2. Image Reconstruction using Wavelets transform.
3. Dehazing images using HE, Fattal method
4. Underwater Image enhancement using Wavelets and equalization
5. Underwater Panoramic Image enhancement using mosaicking techniques

Suggested Books/Resources:

1. Digital Image Processing, R.C. Gonzalez and R.E. Woods, 2nd edition, Pearson Prentice Hall, 2008.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989.
3. Digital Image processing, S Jayaraman, TMH, 2012
4. William K. Pratt, *Digital Image Processing*, 3rd Edition, John Wiley, 2001.
5. Link to topics related to course:
   a. https://nptel.ac.in/courses/117105079/1
   b. https://nptel.ac.in/courses/117105079/6
   c. https://nptel.ac.in/courses/117105079/3
   d. https://nptel.ac.in/courses/117105079/10
   e. https://nptel.ac.in/courses/117105079/12
   f. https://nptel.ac.in/courses/117105079/15
   g. https://nptel.ac.in/courses/117105079/21
   h. https://nptel.ac.in/courses/117105079/29

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	3	3	1	2	2	2	3	3	3	3	2	2.5
CO-2	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.4	2.7	2.9	2.3	2.7	2.7	3	2.4	2.7	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Earthquake Resistant Design of Structures

COURSE CODE: 12M1WCE213

COURSE CREDITS: 3

CORE/ELECTIVE: CORE (M.Tech.)

L-T-P: 3-0-0

Pre-requisite: Engineering Mathematics, Structural Analysis, Structural Dynamics

Course Objectives: Earthquake are random occurrences of ground shaking in the world causing havoc to infrastructure. In this course, students will understand the earthquake load and the behaviour of a structure when subjected to such a load.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO–1	To understand basics of evaluation of ground motion response spectrum	Assessment
CO–2	To be able to calculate the lateral load on a typical building	Assessment
CO–3	To be able to design various design philosophies of earthquake resistant design	Application
CO–4	To be able to design various structural elements for resistance to earthquakes	Application

Course Contents:

Unit	Contents	Lectures required
1.	**Structural Dynamics Review:** Review of MDOF response, Normalization of Modes, Calculation of Damping Matrices, Participation Factors, Base Excitation	2
2.	**Seismology and Earthquake:** Introduction, Internal Structure of Earth, Earthquake Size, Types of Seismic Waves, Ground Motion Parameters, Introduction to Response and Design Spectrum, Calculations of Design Spectrum, Displacement Spectrum, Damping	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Scaling Factors, RotDNN Spectra, Inelastic Spectra (R-μ-T relationships)	
3.	**Design Philosophies:** Discussion of Limit States, Force–based vs displacement–based design, Ductility	6
4.	**Force–Based Calculations:** Analysis Techniques, Equivalent Lateral Force Method, Analysis of Structure, Building Irregularities.	6
5.	**Displacement–Based Calculations:** SDOF systems, MDOF Systems, Structural Analysis (Frames)	6
6.	**Ductile Detailing:** Design considerations from IS 13920, design of example problem.	12
TOTAL		**42**

Suggested Textbook(s):

1. Kramer, S., Geotechnical Earthquake Engineering, Pearson
2. Dowrick, D., Earthquake Resistant Design and Risk Reduction, Wiley India
3. M.J.N Priestley, G.M. Calvi, and M.J. Kowalsky, Displacement–Based Seismic Design of Structures, IUSS Press

Codes:

1. **IS 1893:** Criteria for Earthquake Resistant Design of Structures
2. **IS 13920:** Ductile Detailing of Reinforced Concrete Structures subjected to Seismic Forces

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Throughout the Semester	Assignments–20 Attendance–5 (Will be awarded only if daily assignments are submitted in given time)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) Contributions to the Program Outcomes (POs):

CO	PO–1	PO–2	PO–3	PO–4	PO–5	PO–6	PO–7	PO–8	PO–9	PO–10	PO–11	PO–12	Average
CO–1	3	3	3	3	3	2	2	1	2	2	1	3	2.33
CO–2	3	3	3	3	3	2	2	1	2	2	1	3	2.33
CO–3	3	3	3	3	3	2	2	1	2	2	1	3	2.33
CO–4	3	3	3	3	3	2	2	1	2	2	1	3	2.33
Average	3	3	3	3	3	2	2	1	2	2	1	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Environmental Remediation of contaminated sites

COURSE CODE – 20B2WCE802
COURSE CREDITS: 3
CORE/ELECTIVE: ELECTIVE
L-T-P: 3-0-0
Pre-requisite: water supply, waste water engineering

Course Objectives:

1. Develop understanding of integrated approaches to remediating contaminated sites.
2. Develop the ability to screen, choose and design appropriate technologies for remediation.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn about the water treatments, remedies, toxicology, risk assessments, and other fields within the environmental engineering field.	Familiarity
CO-2	To learn concept of bioremediation and its applications	Assessment
CO-3	The course will focus on how contaminated sites are managed and remediated for new land uses.	Usage
CO-4	Students will learn the theory of how sites are investigated and characterized, how toxicological information is used to estimate the risk to humans and ecosystems, how threats to groundwater are assessed and finally, methods by which these risks and threats are mitigated through remediation approaches.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction, Laws, Regulations and Remediation, Legal Concepts, Types of Law, Regulations, Federal Laws/Regulations: History, Objectives	2
2	Remediation Process, Definition of hazardous waste, Waste Classification, Corrective Action.	4
3	Risk Assessment: Introduction, Terminology, History, Steps in Human Health Risk Assessment: Data Collection and Evaluation, Exposure Assessment, Toxicity Assessment: Risk Characterization, Risk Management, Risk Communication	8
4	Ecological Risk Assessment, Risk-based Corrective Action; Remedial Options: Introduction, Administrative Options, Groundwater, Plume Containment: introduction, extraction wells, extraction trenches, injection wells/trenches, wells/barriers	6
5	Pump and Treat: Introduction, Contaminant behavior, Design considerations, Source Control: Philosophy, Options, Permeable Reactive Barriers: Introduction: Redox reactions, Kinetics, Design considerations	2
6	Monitored Natural Attenuation: Introduction, Evaluation, Monitoring, Mechanisms, Plume Types, Lines of Evidence, Case Study	4
7	Soils/Sediments: Excavation, Use, Techniques, Control of contaminant transport, Typical costs, Landfill: Hazardous waste landfill, Solid waste landfill, Containment: characteristics of barrier materials, alternatives,	8

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	Solidification/Stabilization: Introduction, Fundamentals Chemical and physical, Leaching, Design Considerations, Chemical Treatment, Surfactant extraction, Soil Vapor Extraction.	
8	Bioremediation: Introduction, Fundamentals, Important processes, Examples, Phytoremediation, Mechanisms, Examples.	4
9	Thermal Processes: Introduction, Incineration, Thermal Desorption, Aqueous Oxidation, Soil Washing: Introduction, Process Description, Design Considerations	4
Total lectures		**42**

Suggested Text Book(s):

1. LaGrega, M.D., Buckingham, P.L., Evans, J.C., Hazardous Waste Management, McGraw-Hill, 1994.Haas, C.N., Vamos, R.J., Hazardous and Industrial Waste Treatment, Prentice Hall, Englewood Cliffs, NJ, 1995.
2. Paul Nathanail C. and Paul Bardos R., Reclamation of Contaminated Land, John Wiley and Sons Limited, 2004.
3. Calvin Rose, An Introduction to the Environmental Physics of Soil, Water and Water Sheds, Cambridge University Press, 2004.

Suggested Reference Book(s):

1. Marcel Vander Perk, Soil and Water Contamination from Molecular to Catchment Scale, Taylor and Francis, 2006.
2. William J. Deutsch, Groundwater Geochemistry : Fundamentals and Applications to Contamination, Lewis Publishers, 1997.

Other useful resource(s):

1. Hari D. Sharma and Krishna R. Reddy, Geo-Environmental Engineering: Site Remediation, Water Contaminant and Emerging Water Management Technologies, John Wiley and Sons Limited, 2004.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (10) – 10 Presentation(1) -10 Attendance/Quiz -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Environmental remediation of contaminated sites)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
CO-5	2	2	3	3	3	2	2	1	3	2	2	2	**2.25**
Average	**2**	**2.4**	**2.6**	**2.6**	**2.6**	**1.4**	**1.6**	**1**	**2.2**	**2.2**	**1.6**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Fault-Tolerant System Design

Course Code: 19B1WCI834
Course Credits: 3-0-0
OE for B Tech 8th Sem CSE/IT/ECE/BI

Course Outcomes(COs):

Sr No	Course Outcomes (Fault-Tolerant System Design) 19B1WCI834	Level of Attainment
CO-1	Understand modeling and designing for fault-tolerant systems	Familiarity
CO-2	Learning hardware redundancy techniques for fault tolerance	Assessment
CO-3	Learning fault tolerance from the context of hardware, software and Network	Assessment
CO-4	Learning Simulation, Fault-injection based and Practical Systems for fault tolerance	Assessment
CO-5	Applying knowledge gained on various application as case analysis	Usage

Course Outline:

Modules	Contents	Lectures required
Module-1	Introduction: Motivation, System view of high availability design, Terminology, Stochastic analysis of reliability: Discrete distributions, Continuous distributions.	8
Module-2	Hardware redundancy: Basic approaches, Static & Dynamic, Voting, Coding for detection and recovery , Application: SEC-DED codes, Error detection and correction techniques: Watchdog processors, Heartbeats, Consistency and capability checking, Data audits, Assertions, Control-flow checking, Application: Erasure-coded storage.	6
Module-3	Network fault tolerance: Reliable communication protocols, Agreement protocols, Byzantine fault tolerance, Application: Bitcoin, Modeling: Application: UltraSAN, Sharpe, Checkpointing & Recovery	14
Module-4	Experimental Evaluation: Simulation and Fault-injection based, Practical Systems for Fault Tolerance: Putting it all together, Application: Amazon Web Service, Application: Hadoop	8
	Total	**43**

CO-PO Articulation (19B1WCI834 Fault-Tolerant System Design)	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * SOLAN
IQAC

Srl	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage (%age)
CO-1	M	M	M	M	M	L	L	L	M	M	M	M	52.78
CO-2	M	H	H	H	H	L	L	L	M	M	L	M	63.89
CO-3	M	M	M	M	H	L	L	L	M	M	L	M	66.67
CO-4	M	H	H	H	M	L	L	L	M	H	M	M	66.67
CO-5	M	M	M	M	H	L	L	L	M	M	L	M	66.67
%	66.67	93.33	93.33	93.33	86.67	33.33	33.33	33.33	60.00	66.67	40.00	60.00	52.78

CO- PSOs Articulation					
Sr. No	PSO-1	PSO-2	PSO-3	PSO-4	
CO-1	3	2	2	2	79
CO-2	2	3	2	3	79
CO-3	3	2	3	2	81
CO-4	2	2	2	2	75
CO-5	2	3	2	3	79
Average Score	81	82	85	76	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • H.P. • INDIA

FINANCIAL PLANNING

10B1WPD737

Course Goal

This course is aimed at enabling the students understand the issues involved in planning finances and investments at a personal level. This course intends to give students a deeper understanding of concepts and issues relating to personal finance and their applications to real life situations so that they are capable of acting as a financial planner.

Course Objectives

1. Financial planning process.
2. Terms and concepts relating to personal financial planning.
3. Concepts and issues relating to management of money such as taxes, investments, loans, insurance policies etc. so that students are able to spend and invest their hard earned money wisely.

Detailed Syllabi

Lecture-wise Breakup

Subject Code	10B1WPD737	Semester	8
Subject Name	FINANCIAL PLANNING		
Credits	3	Contact Hours	3

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Financial Planning Process	• Meaning of financial planning • Steps in financial planning process • Determinants of personal	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

		income	
2.	Financial Statements and Plans	• Role of financial statement in financial planning • Preparing a personal balance sheet • Preparing the income and expense statement using personal financial statements • Cash Budgets	3
3.	Taxes	• Concepts of income tax • Personal taxation • Tax planning	6
4.	Cash and Savings	• Role of cash management in personal financial planning • Financial services market • Cash management products • Electronic baking services • Channels of savings	3
5.	Purchase of Automobiles and Houses	• Automobile purchase planning and Car loans • The home buying process and Home loans	6
6.	Credit and Credit Cards	• Credit • Types of credit • Different kinds of credit cards • Disadvantages of the credit	3

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

		cards	
7.	Life Insurance	• Insurance planning • Benefits of life insurance • Calculating insurance needs • Buying a life insurance • Life insurance products in India	4
8.	Health Insurance	• Health Insurance • Types of health care plans • Health Insurance in India.	3
9.	Investments	• Meaning of investment • Types of investment Vehicles • Factors considered in the choice of investments • Developing the investment strategy • Investing in equities, mutual funds and fixed income securities	8
10.	Retirement Planning	• Sources of retirement income • Pension funds.	3
		Total number of Lectures	42

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Lawrence J Gitman and Michael D Joehnk. Personal Financial Planning.
2.	Ernst and Young's Personal Financial Planning guide.
3.	G Victor Hallman and Jerry S Rosenbloom,6th Edition, Mc GRaw Hill. Personal Financial Planning

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Method of Evaluation

The lecture will focus the basic concepts and tutorials will focus real problems and case-studies.	
Components	**Weightage**
T1	**15**
T2	**25**
T3	**35**
Internal assessment: • **Assignments** • **Case study** • **Presentation** • **Class assessment**	**25**

JUIT, Waknaghat

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

From Graph to Knowledge Graph

COURSE CODE: XXX **COURSE CREDITS:** 2 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 2-0-0
Pre-requisite: Basic programming skills

Course Objectives:

1. You will learn graph representations.
2. Understand the entire process of how to design, construct, and query a knowledge graph to solve real-world problems.
3. Understand how to apply the tools and infrastructure to build and query knowledge graphs.
4. Use knowledge graphs in modern search applications.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Learn graph representations	Familiarity
CO-2	Utilize fundamentals to build knowledge graphs	Assessment
CO-3	Understand the algorithms and techniques for crawling web sites, structured data extraction, and information extraction from unstructured text.	Assessment
CO-4	Understand how to apply the tools and infrastructure to build and query knowledge graphs.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	Introduction and Overview Introduction to Graphs, Introduction to Knowledge graphs	4
2	Graph Properties and Applications: Graph basics, Graph Applications	4
3	Graph Representation Learning Embeddings and Graph Embeddings	4
4	Knowledge Graph (KG) - Fundamentals and Construction. KG Fundamentals How to Build a Knowledge Graph	5
5	Knowledge Graph (KG) - Inference and Applications KG Inference. How to Use a Knowledge Graph Why We Need Knowledge Graphs: Applications KG Applications	6
6	Knowledge graph analytics	5
	Total Lecture Hours	**28**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

- Fensel, Dieter (et al.), "Knowledge Graphs Methodology, Tools and Selected Use Cases", Springer, 2020.
- Qi, G. et. al, "Knowledge Graph", Springer, 2020, ISBN 978-981-10-8177-4

Suggested Reference Book(s):

- Jeff Z. Pan, Guido Vetere, Jose Manuel Gomez-Perez, Honghan Wu, " Exploiting Linked Data and Knowledge Graphs in Large Organisations", Springer International Publishing, Print ISBN 978-3-319-45652-2, DOI https://doi.org/10.1007/978-3-319- 45654-6
- Mayank Kejriwal, "Domain-Specific Knowledge Graph Construction", Springer, DOI: 10.1007/978-3-030-12375-8

Other useful resources (s):

- Journal, "Knowledge-Based Systems", Springer

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (From Graph to Knowledge Graph)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

From Graph to Knowledge Graph Lab

COURSE CODE: XXX **COURSE CREDITS:** 1 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 0-0-2
Pre-requisite: Basic programming skills

Course Objectives:

1. The lab is designed to provide a versatile means to perform learning tasks over a knowledge graph.
2. Use Machine Learning over a Knowledge Graph

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	Build a knowledge graph from documents	Usage
CO2	Building a knowledge graph from a text	Usage
CO3	Build a Small Knowledge Graph	Usage
CO4	Understand the Graph Databases	Assessment
CO5	Familiarity with graph computing Frameworks	Familiarity
CO6	Able to Visualization of graphs	Assessment

List of Experiments

S No	Description	Hours
1	Introduction to Linked Data. Loan Prediction Practice Problem (Using Python) Build a knowledge graph from documents	4
2	Build a Small Knowledge Graph Creating and Processing Linked Data Building a knowledge graph from text A Knowledge Graph understanding and implementation	4
3	Build a Small Knowledge Graph Building a knowledge graph in python from scratch	4
4	Introduction to Graph Databases A Python Library for Knowledge Graph Embedding	6
5	Introduction to graph computing Frameworks	4
6	Introduction to Graph Visualization	6
	Total Lab hours	**28**

Suggested/Resources:

- Grakn KGLIB (Knowledge Graph Library) https://github.com/.
- Online resources.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

- Fensel, Dieter (et al.), "Knowledge Graphs Methodology, Tools and Selected Use Cases", Springer, 2020.

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5	Attendance and discipline in lab		15
6	Total		100

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Avg
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
C06	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Avg	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Fundamentals of Next Generation Communication System

Course Objectives:

1. Analyzed the channel parameters effects on communication system.
2. Understanding of advanced techniques employed for improvement of communication system.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basics of communication system and various standards used in different generation.	Familiarity
CO-2	Understand the modeling of channel used in communication.	Familiarity
CO-3	Analyze the effect of various parameters on the performance of communication system.	Assessment
CO-4	Demonstrate the various techniques for performance improvement of communication system	Assessment
CO-5	Apply advanced techniques to next generation communication system	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to various generation of cellular communication systems and standards. **CDMA**: Introduction to CDMA and Spread Spectrum, Generation and Properties of PN Sequences, correlation between PN Sequences, Walsh Code, Variable tree OVSF, LFSR, Rake Receiver, Near-Far effect, Multi user CDMA uplink and downlink	9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Channel Characterization of Next generation communication system:** BER and SNR analysis of wired and wireless channels, Effect of various channel parameters on performance of wireless communication system, Doppler shift.	6
3	**Diversity & Equalization**: Diversity System Model, Receiver Diversity: selection diversity, feedback diversity, maximal ratio combining, equal gain combining, Equalizers, Types of Equalizers: linear equalizers, non-linear equalizers.	9
4	**Principles of OFDM and MIMO wireless communication**: Introduction to OFDM, OFDM Block Diagram, MIMO Wireless Communication, Benefits of MIMO Technology, MIMO OFDM Building Block, Capacity Comparisons of SISO, SIMO, MISO, and MIMO.	9
5	Singular Value Decomposition, Software Defined Radio , Cognitive Radio	9
Total lectures		42

Suggested Text Book(s):

1. T.S. Rappaport, "Wireless Communication", 2nd Edition, Prentice Hall., 2002.
2. A.Goldsmith, " Wireless communication" 1St Edition , Cambridge University Press.2005.
3. Ye Li and Gordon L. Stuber, "Orthogonal Frequency Division Multiplexing for Wireless Communications" 1St Edition, Springer, 2006.

Suggested Reference Book(s):

1. Huseyin Arslan: Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, 1st Edition, Springer, 2007.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. Hui Liu, "OFDM based broadband wireless networks: design and optimization" , 1st Edition, John Wiley & Sons, 2006.

Other useful resource(s):

1 .Link to NPTEL course contents: https://nptel.ac.in/courses/117104099/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Next Generation Communication													Average

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Systems)													
CO-1	2	3	2	2	1	2	2	2	1	2	2	2	**1.92**
CO-2	3	3	3	3	2	2	1	1	1	2	2	2	**2.08**
CO-3	3	3	3	3	2	1	1	1	1	2	1	1	**1.83**
CO-4	2	3	3	2	2	1	1	1	1	2	1	3	**1.83**
CO-5	3	2	2	2	3	2	2	1	1	2	2	2	**2.00**
Average	**2.6**	**2.8**	**2.6**	**2.4**	**2**	**1.6**	**1.4**	**1.2**	**1**	**2**	**1.6**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Genetic Counseling

COURSE CODE: XXXXXXXX

COURSE CREDITS: 3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Genetics

Course Objectives:

1. To provide an understanding of the basis of genetic counseling, diagnostic testing and management for a variety of types of disorders and also the ethical and legal considerations.
2. The students will understand the nature of the non-directive counseling process and the need to educate the patient and family to make informed decisions relating to complex genetic situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand basics of genetic counselling, the nature of the directive and non-directive genetic counselling process and to counsel the patients with genetic diseases and help them in decision making.	Familiarity
CO-2	To understand genetic basis of various diseases (Chromosomal, monogenic and oligogenic disorder).	Assessment
CO-3	To understand gene therapy, its role in genetic disorders and recent developments in gene therapy.	Assessment
CO-4	To understand risk assessment in genetic counseling and ethical issues in genetic counselling.	Usage

Course Contents:

Unit	Topics Covered	Contact Hrs.
1	Genetic Counselling an overview: Counseling, diagnostic testing and management of genetic disorders.	2
2	Human chromosomal disorders: mutations, types of mutations, chromosomal aberrations, quad screen test, Amniocentesis, karyotyping, Down's syndrome, Patau's syndrome, Edward's syndrome, Turner's syndrome, X-chromosome related syndromes.	6
3	Human allelic diseases (monogenic and oligogenic): Cystic fybrosis. Glucose-6-phospho dehydrogenase deficiency Bradet-Biedl syndrome and some important autosomal recessive and dominant disorders	6
4	Muscle disorders: Duchenne muscular dystrophy, Becker's muscular	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	dystrophy, limb-girdle muscular dystrophies and cardiac muscle disorders.	
5	Neurological disorder: Alzheimer, Hutington, Parkinson, Lewy body dementia and Schizophrenia	4
6	Genetic basis of neoplastic disorders: Retinoblastoma, Wilms tumor, Colectral cancer, and Blooms syndrome	6
7	Prenatal Genetic counseling	2
8	Gene therapy: Principles of molecular genetic-based therapies and treatment with recombinant proteins or genetically engineered vaccines The technology of classical gene therapy Gene therapy for inherited disorders Gene therapy for neoplastic disorders The ethics of human gene therapy	7
9	Genetic counseling risk assessment	3
10	Genetic counseling and ethical issues	2
Total Number of Lectures		**42**

Suggested Text Book(s):

1. Strachan T and Read AP (2010) Human Molecular Genetics -4, Garland Science, 4th Ed.
2. Pasternak JJ (2005) An introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases. *Hoboken (New Jersey): John Wiley & Sons*, 2nd Ed.
3. Evans C (2006) Genetic Counselling A psychological approach. New York, NY, US: Cambridge, 1St Ed.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	2	2	2	1	3	2	2	1	3	2.1
CO-2	2	2	3	2	2	1	-	3	2	2	1	3	2
CO-3	2	3	2	2	2	1	-	3	2	3	1	2	2
CO-4	2	3	2	2	2	2	-	3	2	3	1	2	2
Average	2.0	2.75	2.5	2	2	1.5	1	3	2	2.5	1	2.5	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Hazardous Waste Management

COURSE CODE – 14M31CE216

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basics of chemistry

Course Objectives:

1. To provide in depth understanding of Hazardous and Biomedical Waste characteristics and management
2. The course covers the planning and engineering principles needed to address the Hazardous and Biomedical Waste Management.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	A comprehensive overview of hazardous and biomedical wastes management from both scientific and engineering principles point of view.	Familiarity
CO-2	To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for hazardous wastes including the related engineering principles, design criteria, methods and equipment.	Familiarity
CO-3	Understanding of the fundamental principles of existing and emerging technologies for the treatment of hazardous and biomedical wastes.	Familiarity & Familiarity
CO-4	Understanding of the legislative and regulatory framework related to the generation, treatment, storage, and disposal of hazardous and biomedical wastes.	Familiarity & Usage

Course Contents:

Unit	Contents	Lectures required
1	Hazardous Wastes: Definition, Sources and Classification; Characteristics of Hazardous wastes: Ignitability, Corrosivity, Reactivity, Toxicity, Generation of Hazardous Waste, Guidelines of Hazardous Waste Management, Basel Convention, Regulatory frame work: Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; Monitoring of critical parameters/risk-analysis. HAZAN, HAZOP; Environmental Impacts of Hazardous Wastes; Emergency Management: Indian and foreign legislation in respect of the above.	15
2	Storage, Collection and Transport of Hazardous Waste; Processing and Disposal of Hazardous Wastes; Treatment, Storage and Disposal Facility; Hazardous Waste Reduction; Hazardous Waste Treatment, Physical and Chemical Treatment, Thermal Treatment, Incineration, Combustion Calculation and Air requirements, Environmental Control Measures, Pyrolysis, Biological Treatment, Hazardous Waste Landfills, Secure Landfill, Site Selection, Component of Landfill, Landfill Design and Operation, Deep Well Injection.	10

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

3	Hazardous Chemicals: Toxic chemicals, Flammable Chemicals, Pesticides, Explosives, Reactive Substances, Cyanide Wastes, Water-soluble Chemical Compounds of Heavy Metals, & Toxic Metals; Hydrocarbons, Point Pigment Dyes, Oil Emulsion Tars, Phenols, Asbestos, Acid/Alkaline Slurry, Physical Properties, Chemical Composition; Lethal Dose and Concentration on Human Life, Flora and Fauna; Case studies, Leakages, Explosion, Oil-spills, Fire of Hazardous Chemical Storage.	10
4	Biomedical Waste: Definition, Characteristics and Categorization; Handling and Storage, Treatment and Disposal; Biomedical Waste Management; Biomedical Waste Management Rules, 2016. Radioactive wastes, Generation and Processing of Atomic Minerals, Disposal of Fuel rods, Leakage in atomic reactor plants, Remediation of contaminated sites	7
Total lectures		**42**

Suggested Text Book(s):

1. Pichtel, J. (2014). Waste Management Practices: Municipal, Hazardous and Industrial. CRC Press New York: 2nd Edition.
2. VanGuilder, C. (2008). Hazardous Waste Management: An Introduction. New Delhi: Mercury Learning and Information (Second Edition).
3. Rao, M. N., Sultana, R., & Kota, S. H. (2017). Solid and Hazardous Waste Management: Science and Engineering. India: BS Publications

Suggested Reference Book(s):

1. Tchobanoglous, G., Theisen, H., & Vigil, S. A. (2014). Integrated Solid Waste Management: Engineering Principles and Management Issues. New Delhi: McGraw-Hill Education (India) Private Limited.
2. CPHEEO (2000). Manual on Municipal Solid Waste Management, Central Public Health and Environmental Engineering Organisation, Ministry of Urban Development, Govt. of India, New Delhi.

Other useful resource(s):

1. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and "Environmental Resources Management,Hazardous waste Management", Mc-Graw Hill International edition, New York, 2001.
2. Vesilind P.A., Worrell W and Reinhart, "Solid waste Engineering", Thomson Learning Inc., Singapore, 2002.
3. Paul T Williams, "Waste Treatment and Disposal", Wiley, 2005

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (10) - 10 Presentation(1) -10 Attendance/Quiz -5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Hazardous Waste Management)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	1	2	3	3	2	2	1	1	2	1	**1.9**
CO-2	2	3	1	2	1	1	1	2	1	1	1	1	**1.4**
CO-3	3	2	2	2	1	1	2	2	1	1	2	1	**1.6**
CO-4	2	2	1	2	3	1	2	2	1	1	2	1	**1.6**
Average	**2.2**	**2.5**	**1.2**	**2.0**	**2.0**	**1.5**	**1.7**	**2.0**	**1.0**	**1.0**	**1.7**	**1.0**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

HIGHWAY CONSTRUCTION, MAINTAINANCE AND MANAGEMENT

COURSE CODE: 11B1WCE834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-2

Pre-requisite: None

Course Objectives:

1. To enhance / develop the skills of professionals working in construction and allied sectors to upgrade their skills in Construction Contracts Management and help them to grow in their career.
2. To perform different method of construction for rigid and flexible pavements based on traffic and environmental factors
3. To understand the different method of pavement repairing and maintenance
4. To develop basic understanding of the principles of pavement management

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will come to know about the types, working and importance of pavement in different condition (i.e. level or hilly terrain).	Familiarity
CO-2	Through discussion of the topic of highway construction, the students gain an appreciation for the methods and different steps involved in pavement construction.	Assessment
CO-3	Students will analyze different factors which affect the performance of pavement (i.e. environmental or traffic factor) from real-life projects and theoretical examples.	Assessment
CO-4	Students will become familier with the different methods of pavement maintenance.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Highway construction:** Introduction, history of road construction, equipments for the road construction, stages of construction, limitations in pavement construction due to weather. Earthwork: Clearing and grubbing, excavation, embankment construction, replacement of soils, soil stabilization and their types.	8

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Flexible and Rigid pavement construction:** Flexible Pavement: different layers system and their specifications, defects in flexible pavement and their remedies, different types of pavements (i.e. dense bitumen macadam, water bound macadam etc.) and their specifications, different tests for bitumen. Rigid pavement: layer system and specifications, concrete surfacing, provision of different type of joints in rigid pavement, current practices for rigid pavement construction.	8
3	**Highway maintenance:** General, distress in pavements (Cracking, patching, rutting, pot holes, stripping and swelling), evaluation of pavement, structural evaluation, pavement maintenance.	6
4	**Introduction to transport economics:** Recycling of pavements: Introduction, selection of road for recycling, methods and equipments for recycling.	6
5	**Hill Roads:** Alignment, geometrics, design and construction for hill roads, drainage design, maintenance problems in hill roads, slope stability in hill roads, different factors responsible for pavement failure.	8
Total lectures		42

Suggested Text Book(s):

1 Hass, R., Hudson, W.R. and Zaniewski, J. "Modern Pavement Management" Krieger, 1994.

2 Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press, Taylor & Francies Group, 2006.

3 Shain, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Kluwer Academic Publishers Group, 2004.

4 Khanna, S.K. and Justo, C.E.G., "Highway Engineering" Nem Chand & Bros, Roorkee (U.A.) 8th Ed, 2005.

5 Hudson, W.R., Haas, R. and Uddin, W., "Infrastructure Management", McGraw Hill, 1997.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	2	1	2	2	3	3	2	
CO-2	3	3	3	2	3	3	1	3	2	3	2	2	
CO-3	2	2	2	2	3	2	1	2	2	2	2	2	
CO-4	3	3	3	3	2	2	1	2	2	2	3	2	
Average													

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Human Rights For Technocrats

COURSE CODE: 18B1WHS832

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Conceptual background of human rights and duties:** Definitions and classifications	2
2	**Meaning and Significance of Human Rights :** Scope of the Human Rights	2
3	**Relationship between Rights and Duties:** Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	**Universal Declaration of Human Rights: Technical background :** Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5
5	**History of human rights civilization:** Brief history of human Rights, The Spread of Human Rights, Middle Ages, Modern human rights	5
6	**Human rights movements :** Anti-colonialism, World War II and the United Nations, Global human rights struggles, Changes in the 1970s Since the 1990s	8
7	**Enforcement and protection mechanism of human rights in India :** Judiciary, National Human Rights Commission and other Commissions and Committees , Non-governmental organizations, Information Media, Education	5
8	**Development, international trade and human rights:** Right to development: Issues of international equity and justice, equitable access to benefits of science and	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	technology, Freedom of international trade, most- favoured nation treatment (equality of treatment) versus special treatment of the developing countries, access to international markets, equitable pricing of raw material	
9	**Human rights, science and technology:** Overview,violation of human rights by technology	3
10	**Human rights of the working class:** Labour welfare legislation in India, Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	4
Total lectures		42

Suggested Text Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Suggested Reference Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press

Other useful resource(s):

1. https://www.google.com/search?q=Meaning+and+Significance+of+Human+Rights&rlz=1C1GCEU_enBIN820IN820&oq=Meaning+and+Significance+of+Human+Rights&aqs=chrome..69i57j0l5.1710j0j7&sourceid=chrome&ie=UTF-8
2. https://www.equalityhumanrights.com/en/human-rights/what-are-human-rights

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Presentation (1)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Human Rights for Technocrats)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75
CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Industrial Enzymes Technologies

COURSE CODE: 18B1WB T733

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Enzyme production purification and applications

Course Objectives:

1. The objective of the course is to develop an understanding of important aspects of production and purification of industrially important enzyme and their application in industry.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To develop an understanding of basic concepts of enzymes.	Familiarity
CO-2	To understand the basic mechanism of action and working behaviour of enzymes	Assessment
CO-3	To familiarize the students with various applications of enzymes in laboratory as well as Industrial scale.	Assessment
CO-4	To conceptualize about immobilized enzyme technology, and other specific enzymes and their applications.	Usage
CO-5	To familiarize the students with present potential of enzyme in industrial application and improved activity of the enzyme using various molecular biology techniques.	Usage
CO-6	To understand the principle and function of enzyme in various adverse conditions like high temperature and pH(s).	Assessment

Course Contents:

Unit	Contents	Lectures required
	Enzymes: Basic concepts: Enzymes as powerful and highly specific catalysts, Classification of enzymes, free energy and enzymes, the formation of the transition state, catalytic strategies. General properties:	5

Approved in Academic Council held on 25.10.2018
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

1	Enzyme specificity, stability and structure, Factors affecting enzyme activity; effect of pH and Temperature, Substrate and Enzyme concentration.	
2	**Enzyme kinetics**: Michaelis-Menten kinetics, evaluation of parameters in the Michaelis-Menten equation, 3-D structure of active site, Kinetics of single and bi-substrate enzyme catalysed reactions, Inhibition & its kinetics.	**5**
3	**Enzyme preparation techniques:** Sources of enzymes, production,Recovery and purification of intracellular products: cell disruption, chromatographic techniques. Analytical assays of purity level of enzymes.	**3**
4	**Enzyme preparation and application in industries:** Application of enzymes in leather, glucose syrup production, starch and sugar industry, Dairy and food industry, Beverage industry, Textile industry. Hydrolysis of starch and cellulose. Catalytic functions of Cellulase, lipase, esterase laccase amylase, glucose isomerase, protease, xylanase, invertase, peroxidises. Other applications of enzymes in solution: medical applications of enzymes, non-hydrolytic enzymes in current and developing industrial technology.	**10**
5	**Enzyme engineering:** Mechanisms and manifestations of protein denaturation. Strategies for enzyme stabilization: Physical and chemical modifications, Selection, directed evolution and Rational design. design and construction of mutant enzymes, Bifunctional and polyfunctional enzyme, Enzyme in organic solvents.	**5**
6	**Immobilized-enzyme technology**: Introduction, enzyme immobilization method: Entrapment, carrier-binding and cross-linking method. Medical and analytical applications of immobilized enzymes.	**8**
7	**Specified Enzymes and applications:** Thermozymes, Cold adapted enzymes, Ribozymes, Hybrid enzymes, Diagnostic enzymes, Therapeutic enzymes: Characteristics, principles and applications.	6
Total Lectures		**42**

Suggested Text Book(s):

1. Devasena, T., "Enzymology", 1st ed., Oxford University Press, 2010
2. Berg, J.M., Tymoczko, J.L. and Stryer, L., "Biochemistry", 5th ed., W.H. Freeman and Company, New York, 2002.
3. Nelson D.L., Cox M.M., "Lehninger Principles of Biochemistry", 5th ed., W.H. Freeman and Company, New York, 2008.

Suggested Reference Book(s):

1. Pye, E.K. and Wingard, L.B., "Enzyme Engineering II", Plenum Press, 1974.
2. Illanes A, "Enzyme Biocatalysis", Springer Science, 2008.

Other useful resource(s):

https://nptel.ac.in/course.php?disciplineId=102

EvaluationScheme:

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Industrial Enzymes)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	3	1	1	2	2	3	2	2	1	2	1.9
CO-2	1	2	2	2	2	1	-	2	2	2	1	3	1.8
CO-3	2	2	2	2	2	2	1	1	2	-	2	2	1.8
CO-4	2	3	2	1	2	1	-	1	3	2	-	2	1.9
CO-5	1	3	1	3	2	2	1	2	1	2	1	3	1.8
CO-6	1	1	-	2	2	2	2	1	2	2	1	3	1.7
Average	1.5	2.1	1.6	1.8	1.8	1.6	1	1.6	2	2	1.2	2.5	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Infectious diseases

COURSE CODE: 15B1WBT839

COURSE CREDITS: 3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Microbiology, Immunology

Course Objectives:

1. Learn to define the basic concepts related to infectious diseases, immunology and epidemiology.
2. Able to understand the basic forms, functions, behaviour, and diversity of infectious agents and their interactions with the host
3. Able to analyse the underlying principles of mode of action and resistance towards the agents used to treat infectious diseases

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	The students would have knowledge of infectious diseases for practical use in medicine and biotechnology.	Familiarity
CO-2	The students would have in-depth knowledge of basic concepts related to infectious diseases, immunology and epidemiology.	Assessment
CO-3	The students would develop knowledge and understanding of the basic form, function, behavior, and diversity of infectious agents and their interaction with the host.	Assessment
CO-4	The students would develop knowledge and skill about important techniques used to study host –pathogen interactions.	Assessment/Usage
CO-5	The students would have sound knowledge of mode of action and resistance towards the agents used to treat infectious diseases.	Assessment/Usage

Course Contents:

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction to infectious diseases	Infectious and non-infectious diseases, Epidemiology of infectious diseases. Infectious agents, socio economic impact of infectious diseases	6
2	Host response to infections	Bacterial, mycobacterial, viral, helminth, fungal	3
3	Biology of	Morphology, classification, life cycle,	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	infectious agents	pathogenecity, mechanism of replication in bacteria, viruses, protozoa and fungal pathogens	
4	Pathology of Infectious diseases	Pathogenesis, Clinical pathology, Gross pathology, Microscopic pathology.	4
5	Biology of major Infectious diseases	HIV/AIDS, Tuberculosis, malaria, dengue, West Nile virus, chikungunya virus, diarrheal diseases, sexually transmitted infections, influenza, viral hepatitis, Ebola	8
6	Diagnostic techniques for infectious diseases	Immunohistology, Immunohistochemistry/In situ hybridization, Polymerase chain reaction based methods, Flow Cytometry.	5
7	Antimicrobials against infectious agents	Antimicrobial agents, mechanism of action, Antibiotic resistance, various mechanisms of antibiotic resistance	5
8	Emerging infectious diseases and their Social Impact	Emergence of SARS, Zika virus, Ebola and other newly reported diseases along with their Social and Scientific Impact.	4
9	Biological Weapons	Introduction, Concept and examples	2
	Total Number of Lectures		**42**

Suggested Text Book(s):

1. Evolution of infectious disease. Ewald PW. Oxford University Press, New York.1994. ISBN 0-19-511139-7.
2. Emerging Infections 1. Scheld WM, Armstrong D and Hughes JM, Editors. ASM Press, Washinton, DC. 1998. ISBN 1-55581-123-3
3. Emerging Infections 2. Scheld WM, Craig WA and Hughes JM, Editors. ASM Press, Washington, DC. 1998. ISBN 1-55581-141-8.
4. Emerging Viruses. Morse SS, Editor. Oxford University Press, New York. 1993. ISBN 0-19-510-484-6.
5. Modern Infectious Disease Epidemiology: Concepts, Methods, Mathematical Models, and Public Health (Statistics for Biology and Health) Kramer; 2010

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	3	3	3	3	3	3	2	2	1	3	2.6
CO-2	3	3	3	3	3	3	3	3	3	2		3	2.9
CO-3	1	3	3	3	1	1	3	3	3	3		3	2.5
CO-4	3	1	3	3	3	3	2	1			3	2	2.4
CO-5	1	2	3	3			3	3	2	2	2	2	2.3
Average	2	2.4	3	3	2.5	2.5	2.8	2.6	2.5	2.25	2	2.6	

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Name: Information Security
Course Code: P-19B1WCI632
Branch and Semester: CSE 5th Sem
Faculty Coordinators: Dr. Pankaj Dhiman

Course Credits: 02

Session: Jan-May 2022

Pre-requisties: None

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To know about various encryption techniques.
3. To be able to secure a message over insecure channel by various means.
4. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
5. To understand various protocols for network security to protect against the threats in the networks.

Course Outcomes:

S.NO	Course Outcomes	Level of Attainment
CO-1	Identify the security issues in the network and resolve it.	Familiarity
CO-2	Analyse the vulnerabilities in any computing system and hence be able to design a security solution.	Assessment
CO-3	Evaluate security mechanisms	Assessment
CO-4	Evaluate rigorous approaches by key ciphers and Hash functions.	Familiarity
CO-5	Demonstrate various network security applications, IPSec.	Assessment
CO-6	Demonstrate Firewall, IDS, Web Security, Email Security and Malicious software etc.,	Assessment

Unit	Contents	Lectures required
1	Symmetric Cipher Model, Cryptography Classification, Cryptanalysis, Substitution: Other forms, Poly-alphabetic Substitution Ciphers, One-Time Pad, Transposition (Permutation) Ciphers, Product Ciphers.	4
2	Groups, Rings, and Fields, Modular Arithmetic, Euclid"s Algorithm, Finite Fields of the Form GF(p), Polynomial Arithmetic, Finite Fields of the Form GF(2n). Generation of large prime numbers, Prime factorization, Euler Totient Function ø(n), Euler's Theorem, Primality Test- Fermat's Little Theorem, Baillie-PSW, Solovay-Strassen, Miller Rabin Algorithm, AKS Algorithm, Cyclotomicprimality test, Elliptic Curve Primality Test, Prime Distribution, Chinese Remainder Theorem, Primitive Roots, Discrete Logarithms	5
3	Perfect security, Feistel Cipher Structure, Block Cipher- DES, differential and Linear Cryptanalysis,Avalanche Effect, Double-DES, Triple-DES, Electronic Codebook Book (ECB), Cipher Block Chaining (CBC), Message Padding, Cipher Text Stealing (CTS); Stream Cipher- Stream Modes of Operation-Cipher Feedback (CFB), Output	5

QAC

	Feedback (OFB), Counter (CTR), AES	
4	Standards Organizations, Security Components OSI Security Architecture, Aspects of Security, Passive Attacks, Active Attacks, Security Services (X.800), Security Mechanism, Security Mechanisms (X.800), Services and Mechanisms Relationship, Model for Network Security, Model for Network Access Security,	4
5	RC4; Pseudo number generation- Linear-Congruential Generators, Blum BlumShub Generator, Nonlinear Generators, RNGs used in Common Software Packages, Block Ciphers as PRNGs, ANSI X9.17 PRG, Hardware Random number generator, Attacks, Entropy Gathering Daemon (EGD), Intel Digital Random Number Generator (DRNG), RNG in Linux, Windows and iOS7.	4
6	The Key Distribution Problem, Public-Key Cryptosystems, The RSA Algorithm	1
7	The Key Management riddle, The Diffie-Hellman Key Exchange, Elliptic Curve Cryptography,	1
8	Authentication, Access control policies, The Message Digest (MD5) Algorithm, RIPEMD-x and HMAC fundamentals, Message Authentication, requirements and functions, Message Authentication Codes, Hash Functions, Birthday Problem, SHA-X, SHA-512 overview, KECCAK,	4
9	Digital Signature basics, Authentication Protocols, The Digital Signature Standard, Kerberos Authentication scheme, Replay Attacks,The X.509 Directory Authentication scheme, Needham Schroeder Protocol,	2
10	Session security, SSL, SSH, Web security, HTTPS IEEE 802.11, Wireless Application Protocol, Wireless Markup Language, Wired Equivalent Privacy (WEP), Wireless Transport Layer Security.	2
Total		32 hr

Suggested Text books:

1. **"Cryptography & Network Security" by Stallings, William (Seventh Edition or later).**

Other useful resources:

1. **Virtual Labs: http://cse29-iiith.virtual-labs.ac.in/index.php?section=Experiments Students are advised to practice virtual lab experiments at above link as and when the topics are covered in the class.**

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2)- 10 Attendance – 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course PO/CO

Course outcomes (Cryptography and Network Security)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	1	3	2	2	1	1	1	1	1	1	1.6
CO-2	3	2	1	2	2	3	1	3	3	1	2	3	2.2
CO-3	2	2	3	1	2	2	3	2	2	3	2	1	2.1
CO-4	2	3	3	3	2	3	2	3	2	1	2	1	2.3
CO-5	3	2	3	1	2	3	3	2	3	1	2	3	2.3
CO-6	3	2	1	1	2	2	2	3	2	1	1	1	1.8
Average	2.7	2.2	2	1.8	2	2.5	2	2.3	2.2	1.3	1.7	1.7	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Information Security Lab

COURSE CODE: XXX **COURSE CREDITS:** 1 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 0-0-2

Pre-requisite: None

Course Objectives:

1. To understand the basic security algorithms
2. To Implement various symmetric cipher
3. To implement various public-key encryption algorithms

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	Understand the basic security services e.g. Authentication, Access Control, Confidentiality, Integrity	Familiarity
CO2	Learn standard symmetric encryption algorithms	Assessment
CO3	Learn architecture for public and private key cryptography.	Assessment
CO4	Learn the methods of digital signature and encryption.	Assessment
CO5	Learn key management and how key exchange protocols work.	Uses
CO6	Learn futuristic cryptographic techniques like Elliptic Curve and quantum cryptography	Assessment

List of Experiments

S No	Description	Hours
1	Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.	2
2	Study of System threat attacks - Denial of Services	2
3	Study of Sniffing and Spoofing attacks	2
4	Study of Techniques uses for Web-Based Password Capturing	2
5	Study of Different attacks causes by Virus and Trojans	2
6	Study of Anti-Intrusion Technique – Honey pot	2
7	Study of Symmetric Encryption Scheme – RC4	4
8	Implementation of S-DES algorithm for data encryption	4
9	Implementation of Asymmetric Encryption Scheme – RSA.	4
10	Study of IP based Authentication	4
	Total Lab hours	**28**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT • AGO

Suggested/Resources:

- Atual Kahate, " Cryptography and Network Security", TMH.
- William Stalling, " Cryptography and Network Security", Pearson.

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5	Attendance and discipline in lab		15
6	Total		100

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Avg
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.8
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.8
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.8
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.3
Avg	2.7	2.8	2.8	2.8	2.5	2.2	1.3	1.2	1.2	1.2	1.3	1.5	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

International Business Management

COURSE CODE: 18B1WHS637

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

~~Pre-requisite:~~ ~~None~~

Course Objectives:

1. Understand different issues of International Business.
2. Analyze how different environment affects the business of a Multi National Companies.
3. Understand the importance of different theories of explaining international trade and businesses.
4. Understand the role of International Institutions in promoting and stabilizing the international integration.
5. Design a suitable strategy for international trade, for a firm, depending upon the economic conditions of both home and host countries.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding international boundaries and different issues of international business.	Familiarity
CO-2	Understanding and analyzing different environmental factors affecting international business.	Assessment
CO-3	Assessing the importance of international trade theories	Assessment
CO-4	Analyzing the roles and responsibilities of different international institutions promoting international business	Assessment
CO-5	Designing a suitable strategy of international business	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Introduction and Basic Understandings of World Map	2
2	**Understanding Globalization:** Globalization and International Business	4
3	**International Business Environment:** a) Socio-Cultural Environment b) Political and Legal Environment c) Economic Environment	6
4	**International Trade and Investment Theories:** a) International Trade Theories b) Theories of Foreign Exchange c) Foreign Direct Investment d) Regional Economic Integrations	12
5	**Institutional Framework for International Business:** a) WTO (GATT) b) The World Bank Group c) International Monetary Fund (IMF) d) UNCTAD e) Indian Institutions	9
6	**International Business Strategy:** a) Organization and Strategy of International Business b) Country Evaluation and Selection	9

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	c)	Entry Strategy and Strategic Alliances (includes Export- Import, Direct Investments and Collaborative Strategies)	
Total lectures			**42**

Suggested Text Book(s):

1. Daniels, Radebaugh, Sullivan and Salwan: International Business, Pearson Education
2. Hill and Jain: International Business, TMH
3. Czinkota, Ronkainen and Moffet: International Business, Wiley
4. Newspapers, Magazines and Internet

Suggested Reference Book(s):

1. Cherunilam: International Business, PHI
2. Jsutin Paul: International Business, PHI
3. Rakesh Mohan Joshi: International Business, Oxford

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Class Performance - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (International Business Management)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0.0	1.0	0.0	1.0	2.0	2.0	2.0	2.0	2.0	3.0	0.0	2.0	1.4
CO-2	0.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
CO-3	0.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CO-4	0.0	1.0	1.0	1.0	2.0	1.0	2.0	3.0	1.0	3.0	1.0	1.0	1.4
CO-5	0.0	2.0	3.0	3.0	3.0	2.0	1.0	3.0	3.0	2.0	2.0	2.0	2.2
Average	0.00	1.50	1.50	1.67	2.50	1.67	1.67	2.33	1.83	2.17	1.33	2.00	1.6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

International Human Resource Management

COURSE CODE: 18B1WHS635

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn to appreciate the complexities and differences of operating a business in an international context
2. Learn IHRM systems, their main challenges in MNC's and improve their performance
3. Learn to efficiently implement specific IHRM activities –Recruitment, Selection, and Training
4. Learn to make better strategic decisions about people in international settings
5. Learn different work cultures and an approach to make yourself Culture –fit

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Learn to appreciate the complexities and differences of operating a business in an international context	Usage
CO-2	Learn IHRM systems, their main challenges in MNC's and improve their performance	Usage
CO-3	Learn to efficiently implement specific IHRM activities –Recruitment, Selection, Training	Usage
CO-4	Learn to make better strategic decisions about people in international settings	Usage
CO-5	Learn different work cultures and an approach to make yourself Culture –fit	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to IHRM**: Defining International HRM .Variables that moderate differences between domestic and international HRM .Applying a strategic view of IHRM **Case** : NCR in Scotland	3
2	**Internationalization of HRM :Socio-Cultural Contexts:** National Culture and HRM. HRM and its broad context. National Culture and Specific HRM Issues. Business imperatives and Other non – cultural influences on HRM. **Case:** Oki UK ltd	3
3	**National Context of HRM: case of 7 major economies:** Major economies and their HRM practices 1. HRM in Japan 2. HRM in the United States 3. HRM in the United Kingdom 4. HRM in Turkey 5. HRM in the Arab Middle East 6. HRM in India	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

	7. HRM in China **Case** :Litton imports cell manufacturing from Sweden	
4	**Staffing International operations for sustained global growth:** Approaches to staffing. Transferring staff for international business activities. The roles of an expatriate. The role of expatriates. Return on investment of international assignments. The role of the corporate HR function in MNEs	**3**
5	**Recruiting and selecting staff for international assignments:** Issues in staff selection. Factors moderating performance. Selection Criteria. Dual career couples. Are female expatriates different?	**3**
6	**International training and development:** The role of expatriate training. Components of effective pre-departure training programmes. The effectiveness of pre-departure training. Developing staff through international assignments. Trends in international training and development **Case** : Seiko Instruments **Case** : Transfer of Knowledge in Oki-Training and development	**5**
7	**International compensation:** Objectives of international compensation. Key components of an international compensation program. Approaches to international compensation.	**3**
8	**Re-entry and career issues:** The repatriation process. Individual reactions to re-entry. Multinational responses. Designing a repatriation programme	**3**
9	**IHRM in the host country context:** Standardization and localization of HRM practices. Factors driving standardization. Factors driving localization. Code of conduct- monitoring HRM practices in the host country. Managing human resources in off shoring countries	**4**
10	**International industrial relations :** Key issues in international relations. Trade unions and international industrial relations **Case :** Elementis and Michelin	**4**
11	**Performance Management:** Multinational performance management. Performance management of international employees. Performance appraisal of international employees .**Case :** Tubular Industries Scotland Ltd.	**3**
12	**IHRM trends: complexity, challenges and choices in the future:** Strategic HRM: research issues and theoretical developments **Case :** Orgaon laboratories ltd, Scotland	**3**
Total lectures		**42**

Suggested Text Book(s):

1. Peter J. Dowling, Marion Festing & Allen D. Engle, SR.:International Human Resource Management (fifth Edition)
2. Jackson, T.: International dimensions of human resource management. London, 2002.
3. D. Briscoe, R. Schuler, & I. Tarique (2012). International Human Resource Management (4th Edition). London/New York: Routledge

Other useful resource(s):

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (International Human Resource Management)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	2	3	3	3	3	2	2	2	3	0	3	2.1
CO-2	0	2	3	3	2	3	2	2	2	3	0	3	2.25
CO-3	0	3	3	3	2	3	2	3	2	3	0	3	2.25
CO-4	0	3	3	3	2	3	2	2	2	3	0	3	2.1
CO-5	0	3	3	3	2	3	2	2	2	3	0	3	2.1
Average	0	2.6	3	3	2.2	3	2	2.2	2	3	0	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Internet Marketing

COURSE CODE: 13B1WHS834

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To develop the student's understanding on how the internet has become a necessity in modern business
2. Discover how this medium can assist in marketing. It
3. Examine the fundamental principles associated with the strategic adoption, implementation, use and evaluation of internet in organizations. Essentially, the focus is on
4. Understand how the internet can serve as an invaluable resource for the strategic business and competitive advantage.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the importance of Internet marketing	Familiarity
CO-2	Gain familiarity with fundamental marketing concepts	Assessment
CO-3	Develop Internet marketing mix	Assessment
CO-4	Evaluate modern day internet marketing technology	Usage
CO 5	To understand and decipher elements of electronic service quality and CRM	Assessment

Course Contents:

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	**Marketing management Fundamentals:**	Concept, Segmentation, Targeting , Positioning, Marketing mix	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

2.	**Introduction to Internet marketing** Relevance of the Internet to the modern marketing concept, Internet marketing, E-marketing, E-commerce and E-business, Differences between Internet marketing and traditional marketing. Internet & different marketing functions.	3
3.	**Internet micro and macro environment** Different elements of the Internet environment - competitor, customer and intermediary use of the Internet. Changes in business models enabled by e-commerce .Legal, moral and ethical constraints and opportunities on an organization. Social media marketing	5
4.	**Internet Marketing Mix** Internet marketing strategy to marketing and business strategy ,opportunities and threats arising from the Internet, elements of the marketing mix in an online context, characteristics of an online brand	4
5.	Consumer Behavior Online Changing Patterns of Consumer behaviour,Use of Market segmentation in Consumer Behaviour, Dimensions of Consumerism, Process of Motivation	4
6.	**Interactive marketing communications** Communications characteristics between digital and traditional media, methods for online and offline promotion. Importance of integrating online and offline promotion. methods of measuring site effectiveness	4
7.	**E-service quality** Different stages involved in creating a new site or relaunching an existing site. Design elements that contribute to effective web site content.Factors that are combined to deliver an effective online customer experience.	4
8.	**Customer relationship management** Concepts of relationship direct and database marketing on the Internet, potential of the Internet to support one-to-one marketing and the range of techniques and systems available to support dialogue with the customer over the Internet.	4
	Business-to-business Internet marketing Principal uses of the Internet in business-to-business markets. Impact of Internet technologies on buyer/supplier processes, relationships and markets.	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Advanced Topics SEO, SEM, TEES, Commercial aspects of Cloud Computing, Big Data & Marketing Intelligence, E-Squal, Digital India	6
Total lectures		**42**

Suggested Text Book(s):

1. E-Marketing 5/E by Judy Strauss and Raymond Frost ©2009 Pearson Education, Inc. Publishing as Prentice Hall
2. Internet Marketing: Strategy, Implementation and Practice, 3/e by Dave Chaffey
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan

Other useful resource(s):

1. http://www.digitalindia.gov.in/
2. http://www.socialbeat.in/2016/07/19/digital-marketing-industry-report-india-2016/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment :10 Class activities :10 Attendance:5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	x	2	x	x	x	x	x	x	x	1	3	1	0.58

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO2	x	2	x	x	x	x	1	x	x	x	3	1	**0.58**
CO3	x	2	3	x	2	x	x	x	3	x	3	1	**1.17**
CO4	1	2	3	2	2	x	x	x	x	x	3	1	**1.17**
CO5	x	2	x	x	x	2	1	2	3	1	3	1	**1.25**
Average	**0.20**	**2.00**	**1.20**	**0.40**	**0.80**	**0.40**	**0.40**	**0.40**	**1.20**	**0.40**	**3.00**	**1.00**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Humanities and Social Sciences

IQAC

Internet of Things

COURSE CODE: 18B1WCI738

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Programming experience, preferably in MATLAB, and/or C/C++/C#/Python/Java

Course Objectives:

1. Understand the basics of IoT, The various IoT protocols and applications of various IoT technologies.
2. Be familiar with the basics of Contiki OS and standardized protocols for IPv6 Low power networking
3. Know the IEEE 802.15.4 standard and 6 LoWPAN technology
4. Understand the RPL protocol and to understand the various routing Issues in IoT
5. Be exposed to the security issues, data collection and distributed computing

Course outcomes:

S.NO	Course outcomes	Level of Attainment
CO-1	To learn IoT Architecture, Security Concerns, Security challenges and Issues, IoT five layers Security at different layers, The IoT protocols	Familiarity
CO-2	To learn about Contiki Operating System, The Hardware Platforms, IP networking, The standardized protocols for IPv6 Low power networking, The COOJA network simulator.	Familarity
CO-3	To learn The IPv6 packet format, IEEE 802.15.4 standard, IPv6 over IEEE 802.15.4, 6LoWPAN packet format, Addressing, Forwarding and Routing, Header compression, Fragmentation and Reassembly, Multicasting.	Assessment
CO-4	To study the Routing Issues in IoT, The RPL protocol and Distance Vector Routing, Storing and Non-Storing Mode of Operation, RPL control messages (ICMPv6) i.e, DIO-DAO-DIS, The objective function, Loop detection and Repair mechanisms, RPL implementation with COOJA simulator	Assessment
CO-5	To study the various development boards and their interfacing with IoT	Assessment
CO-6	To learn about Security Issues in RPL, Data collection for IoT applications, Distributed Computing in IoT	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Internet-of-Things (IoT)** Introduction to IoT, The IoT Architecture, Security Concerns, Security challenges and Issues, Security at different layers, The IoT protocols	4
2	**Contiki Operating System** The Overview of Contiki Operating System, The Hardware Platforms, IP networking, The standardized protocols for IPv6 Low power networking, The COOJA network simulator	4
3	**IEEE Standards** The IPv6 packet format, IEEE 802.15.4 standard, IPv6 over IEEE 802.15.4, 6LoWPAN	12

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	packet format, Addressing, Forwarding and Routing, Header compression, Fragmentation and Reassembly, Multicasting	
4	**Routing** Routing Issues in IoT, The RPL protocol and Distance Vector Routing, Storing and Non-Storing Mode of Operation, RPL control messages (ICMPv6) i.e, DIO-DAO-DIS, The objective function, Loop detection and Repair mechanisms, RPL implementation with COOJA simulator	12
5	**Security Issues** Security Issues in RPL, Data collection for IoT applications, Distributed Computing in IoT	10
Total Lectures		42

Suggested Text Book(s):

i. Internet-of-Things (IoT) Systems Architectures, Algorithms, Methodologies, Dimitrios Serpanos and Marilyn Wolf, 1st edition, Springer, 2017.

ii. Building The Internet-of-Things, Maciej Kranz, Wiley, 2016.

Suggested Reference Book(s):

iii. Learning Internet-of-Things, Peter Waher, Packt Publisher, 2015.

iv. IoT in 5 days: an easy guide to Wireless Sensor Networks (WSN), IPv6 and the Internet-of-Things(IoT) , Antonio Linan Colina , Alvaro Vives, Antoine Bagula, Marco Zennaro and Ermanno Pietrose, 2015.

Other useful resource(s):

Link to NPTEL course contents: https://nptel.ac.in/courses/106105166/

Link to topics related to course:

i. https://nptel.ac.in/courses/106105166/1
ii. https://nptel.ac.in/courses/106105166/6
iii. https://nptel.ac.in/courses/106105166//3
iv. https://nptel.ac.in/courses/106105166//10
v. https://nptel.ac.in/courses/106105166//12
vi. https://nptel.ac.in/courses/106105166//15
vii. https://nptel.ac.in/courses/106105166/21
viii. https://nptel.ac.in/courses/106105166//29

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 hr.	Syllabus covered up to Test- 1.
2	T-2	25	1.5 hr.	Syllabus covered up to Test- 2.
3	T-3	35	2 hr.	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Internet of Things)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	**2.4**
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	**2.5**
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	**2.4**
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-6	3	3	3	2	3	3	2	2	1	3	1	3	**2.4**
Average	**3**	**3**	**3**	**2**	**2.7**	**2.8**	**2**	**2**	**2.3**	**3**	**1**	**3**	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Machine Learning

COURSE CODE: 18B1WCI634

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
4. Be able to design and implement various machine learning algorithms in a range of real-world applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in machine learning	Familiarity
CO-2	To learn about the definition of learning systems, their goals and applications in machine learning	Familiarity
CO-3	To understand concepts associated with classification and experimental evaluation of classification algorithms	Assessment
CO-4	To learn concepts associated with decision trees and experimental evaluation of classification algorithms	Assessment
CO-5	To learn about instance-based learning, clustering and unsupervised learning	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. **Inductive Classification:** The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.	5
2	**Decision Tree Learning:** Representing concepts as decision trees. Recursive induction of decision trees. **Picking the best splitting attribute:** entropy and information gain.Overfitting, noisy data, and pruning, Linear regression	5
3	**Artificial Neural Networks:** Neurons and biological motivation. Perceptrons, Multilayer networks and back propagation. **Bayesian Learning:** Probability theory and Bayes rule. Naive Bayes learning algorithm. Logistic regression	5
4	**Support Vector Machine,** Kernel function and Kernel SVM **Instance-Based Learning:** Constructing explicit generalizations versus comparing to past specific examples. k-Nearest Neighbor algorithm. Case-based learning.	5

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Genetic Algorithm and Evolutionary Algorithms Introduction.** Representing hypothesis, Genetic Operators, Fitness function and selection. Hypothesis space search Genetic Programming	6
6	**Clustering and Unsupervised Learning:** Learning from unclassified data. Hierarchical Agglomerative Clustering. k-means partitioned clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.	6
Total lectures		**32**

Suggested Text Book(s):

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin.

Suggested Reference Book(s):

1. Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006
2. T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.
3. Ian H. Witten & Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufmann, 1999.
4. S. M. Weiss & C. A. Kulikowski, "Computer Systems that Learn", Morgan Kaufman Publishers, San Fancisco, CA, 1991

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs40/preview
2. Link to topics related to course:
   i. https://in.udacity.com/course/intro-to-machine-learning--ud120-india
   ii. https://www.edx.org/learn/machine-learning
   iii. https://www.datacamp.com/courses/introduction-to-machine-learning-with-r
   iv. https://www.simplilearn.com/big-data-and-analytics/machine-learning-certification-training-course

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.8	2.8	2.2	2	2.2	3	1	3	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Machine Learning Lab

COURSE CODE: 18B1WCI674

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. To understand the working of Machine learning tools and languages.
2. To learn the implementation of classification techniques for any dataset.
3. To conduct experiments for clustering techniques for any dataset.
4. To discuss different classification and clustering algorithms based on the analysis of results obtained from experimental evaluation.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To implement classification algorithms in python	Usage
CO-2	To implement Clustering algorithms in python	Usage
CO-3	To implement Genetic Algorithms in Python	Usage
CO-4	Top compare different algorithms based on some common factors	Assessment

List of Experiments:

S. No.	Description	Hours
1	Selection of dataset and brief introduction about Python framework for machine learning experiments.	2
2	Dataset upload and visualization in Python. • How to upload a dataset in Python • How to retrieve rows and data in the dataset • How to create visualization of data	2
3	Decision tree using Entropy and Information Gain	2
4	Random forest tree and evaluation of Decision Tree	2
5	Linear Regression	2
6	Artificial Neural Network • Perceptron • Multi-Layer Neural Network • Back propagation	4
7		
8	Naive Bayes Classifier	2
9	Logistic regression	2
10	Support Vector Machine, Kernel function and Kernel SVM	2
11		
12	Genetic Programming	2
13		
14	Clustering: k-means	2
Total Lab hours		**26**

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Books/Resources:

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
2. Sebastian Raschka, "Python Machine Learning", Packt Publishing Ltd.
3. Andreas C. Müller, Sarah Guido, "Introduction to Machine Learning with Python", O'Reilly Media, Inc.
4. Sunila Gollapudi, "Practical Machine Learning", Packt Publishing Ltd
5. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, Inc.
6. Willi Richert, "Building Machine Learning Systems with Python", Packt Publishing Ltd.
7. Link to topics related to course:
   i. https://www.python-course.eu/machine_learning.php
   ii. https://www.analyticsvidhya.com/blog/2018/05/24-ultimate-data-science-projects-to-boost-your-knowledge-and-skills/
   iii. https://www.datacamp.com/

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	2	2	3	1	1	1	1	1	2	2	1.8
CO-2	3	3	3	3	3	2	1	2	2	1	2	3	2.3
CO-3	3	3	2	3	3	2	1	2	2	1	2	3	2.3
CO-4	3	3	3	3	3	2	1	2	2	1	2	3	2.3
Average	3	2.8	2.5	2.8	3	1.8	1	1.8	1.8	1	2	2.8	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Manufacturing Process and Industrial Products

COURSE CODE :

COURSE CREDITS : 03

: 3-0-0

CORE/ELECTIVE : Elective

Pre-requisite: None

Course Objectives:

The objective of this course is to learn the advanced technologies in manufacturing of therapeutic and plant-based biotechnological products which coupled with the industrial-scale knowledge of biotechnological production and latest downstream process scheme and techniques.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Manufacturing technologies for Therapeutic and Pharmaceutical compounds	Familiarity and Usage
CO-2	Manufacturing of plant-based bioactive /secondary compounds	Familiarity and Usage
CO-3	Manufacturing of Alcoholic beverages	Familiarity and Usage
CO-4	Manufacturing Biotechnological products: Industrial scale approaches	Familiarity and Usage
CO-5	Manufacturing technologies for Biotechnological products: Advanced DSP Approaches	Familiarity and Usage

Course Contents:

Unit	Contents	Lectures required
1	**Manufacturing technologies for Therapeutic and Pharmaceutical compounds** Microbial production Technology of Therapeutic enzymes: L-asparaginase, L-glutaminase, Pencillin acylase and nattokinases Biocatalysts towards production of pharmaceutically active racemic mixtures	12
2	**Manufacturing of plant-based bioactive**	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	/secondary compounds Plant-Associated Microorganisms (Endophytes) as a New Source of Bioactive Natural Products Biotechnological Methods for Selection of High-Yielding Cell Lines and Production of Secondary Metabolites in Medicinal Plants	
3	**Manufacturing of Alcoholic beverages** Wine Biotechnology: Manufacturing and technological considerations of White, Red, Sparkling, Fortified, and Cider	5
4	**Manufacturing Biotechnological products: Industrial scale approaches** Industrial-Scale Fermentation Scale-Down: Simulating Large-Scale Cultures in the Laboratory	9
5	**Manufacturing technologies for Biotechnological products: Advanced DSP Approaches** Schematic approaches for the Isolation and Purification of Fermentation Products Advances in Biochromatography: Dye-ligand Affinity chromatography, Immobilized metal-ion affinity chromatography (IMAC) and Immobilized histidine ligand affinity chromatography	9
	Total Lectures	42

Suggested Text Book(s):

- Current Developments in Biotechnology and Bioengineering: Production, Isolation and Purification of Industrial Products by Ashok Pandey, Sangeeta Negi, Carlos Ricardo Soccol
- Medicinal Plant Biotechnology by Oliver Kayser and Wim J. Quax
- Current Developments in Biotechnology and Bioengineering: Food and Beverages Industry Edited by Ashok Pandey, Maria A´ngeles Sanroma´n, Guocheng Du, Carlos Ricardo Soccol, Claude-Gilles Dussap
- Industrial Biotechnology by Christoph Wittmann and James C. Liao
- Biochromatography: Theory and practice Edited by M.A.Vijayalakshmi
- Review and research articles from Science Direct, Springer, Wiley and PubMED publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	2	3	1	1	2	2	3	2	2	1	2
CO-2	1	2	2	2	2	1	-	2	2	2	1	3
CO-3	2	2	2	2	2	2	1	1	2	-	2	2
CO-4	2	3	2	1	2	1	-	1	3	2	-	2
CO-5	1	3	1	3	2	2	1	2	1	2	1	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Nano-Biotechnology

COURSE CODE: 18B1WBT633

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic of Physics, Chemistry and Biology

Course Objectives:

1. Introduction to Nanomaterial and various material used for obtaining nano-materials
2. Learn various approaches or methods used for nanomaterial synthesis.
3. To learn various analytical techniques used for nanomaterial characterization.
4. Learn various applications of nanomaterial in health care, agriculture and environmental monitoring

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduction to Nano (Basics to Nanoscience and Nanotechnology)	Familiarity
CO-2	Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterial and fundamental properties of Nano-materials(Nano-effect)	Assessment & Technical
CO-3	Introduction to various technique used for the characterization of nanostructures and nanomaterial.	Assessment & Technical
CO-4	Fundamental understanding of nanomaterial/nano-biotechnological application in health and disease.	Usage
CO-5	Fundamental understanding of nanomaterial/nano-biotechnological application in Environment and food - detection and mitigation	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction, History &Applications:**Various definitions and Concept of Nano-biotechnology & Historical background. Fundamental sciences and broad areas of Nano-biotechnology. Various applications of Nano- biotechnology, Cell – Nanostructure interactions	6
2	**Synthetic methodologies:**Introduction to the two approaches (bottom up and top down) followed for the synthesis of nanomaterials: Lithography method, Electrochemical method, Mechanical Method, Chemical Synthesis, Chemical vapour deposition, Molecular self-assembly, Laser Induced assembly.	10
3	**Techniques used for the characterization of nanoparticles:**Principles of microscopy-light, electron, fluorescent confocal, scanning and transmission microscopes, different fixation and staining techniques for EM. Principles of spectroscopy-UV, visible, CD, FTIR, NMR, and ESR spectroscopy, structure determination using X-ray diffraction, analysis using light scattering.	13
4	**Nano-biotechnologicalapplications in health and disease:**Properties of different types of nanoparticles normally used in health and disease. Diagnostics and theranostics application of nanomaterials in health sciences.	6
5	**Nanobiotechnological applications in Environment andfood - detection and mitigation:**Properties of different types of nanoparticles normally used in environmental and food sciences. Detection and removal of toxic metal ion from polluted sample and detection and removal of pathogen form food sample.	7
Total Lectures		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Solan (H.P.)

IQAC

Suggested Text Book(s):

1. C. A. Mirkin and C. M. Niemeyer. Nanobiotechnology - II more concepts and applications. (2007) - Wiley VCH.
2. P. Boisseau, P. Houdy, M. Lahmani, Nanoscience: Nanobiotechnology and Nanobiology

Suggested Reference Book(s):

1. A. Nouailhat, An Introduction to Nanoscience and Nanotechnology, Wiley
2. D.A Phoenix, W. Ahmed, Nanobiotechnology, One Central Press Ltd, UK
3. L. Filipponi, D. Sutherland, Nanotechnologies: Principles, Applications, Implications and Hands-on Activities.Directorate- European commission

Other useful resource(s): Link to NPTEL course contents

- https://nptel.ac.in/courses/118107015/
- https://onlinecourses.nptel.ac.in/noc17_bt17/preview
- http://videos.gitam.edu/nptel/nano.html

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage/Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Quiz, Assignment, Attendance, etc.

Course Outcomes (COs) contribution to the programme Outcomes (POs):

Course outcomes (NanoBiotech.)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	1	2	3	2	1	1	1	2	2	1.7
CO-2	2	3	2	2	3	2	2	2	1	1	3	2	2.1
CO-3	3	3	2	2	3	2	2	2	1	1	3	2	2.2
CO-4	2	2	3	3	2	3	2	2	2	2	3	2	2.3
CO-5	2	2	3	3	2	3	3	2	2	1	3	2	2.3
Average	2.2	2.4	2.2	2.2	2.4	2.6	2.2	1.8	1.4	1.2	2.8	2.0	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 28 July 2021

Network Management

COURSE CODE: 18B1WCI845

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Computer Networks, Cryptography and Network Security

Course Objectives:

1. Learn to develop applications to manage Networks.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Become familiar with the Network Management Standards	Usage
CO-2	Understand the SNMP protocols	Usage
CO-3	Understand how large-scale Network Management Systems operate	Usage
CO-4	Understand how large-scale Network Management Systems are configured	Usage
CO-5	Advanced network Management Tools and Systems	Assessment
CO-6	Web Based Network Management Systems	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Data Communications and Network Management Overview** Review of Computer Network Technology, Basic Foundations of Network management, standards, models and languages	10
2	**Network Management Models** SNMP v1 Organisation and Information models, SNMP v1 Communication and functional Models, SNMP v2, SNMP v3, SNMP management RMON	14
3	**Network Design** Design of Data Communication Networks, Design of Tele Communication Networks, Design of Trasportation networks	6
4	**Broadband Network Management:** ATM Networks, Broadband Network Management: Access Networks, TMN	6
5	**Network Management Tools:** Network Management Tools systems and applications, Network Management applications	4
6	**Web Based Network Management:** Ubiquitous Web Based Network Management	2
Total lectures		42

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Suggested Textbook:

1. Mani Subramanian., Pearson Education, *Network Management Principals and Practices*

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Network Managemen)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	2.5
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	2.6
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	2.4
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	2.5
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	2.4
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	2.6
Average	2.7	2.2	2.7	2.2	2.5	2.5	2.5	2.5	2.2	2.7	2.8	2.7	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 28 July 2021

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

NGS Data Analysis and Applications

COURSE CODE: 18B1WBI834 COURSE

CREDITS: 3 CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

Course Objectives:

1. To acquire basic knowledge of Next Generation Sequencing approaches in genomic research.
2. To understand computational and statistical principles for analysing genomic data.
3. To understand and formulate questions to investigate deep sequencing data.

Course Outcomes

S.No.	Course Outcomes	Level of Attainment
CO-1	The students will acquire knowledge of Next Generation Sequencing technologies used in genomics and genetics research.	Familiarity
CO-2	The students will learn about the various platforms used in NGS.	Assessment
CO-3	The students will learn about the tools and techniques used in NGS data analysis.	Usage
CO-4	The students willknowtheapplications and scopes of genomics research using the latest genome-wide data centric approaches.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Overview of Sequencing Technologies**: Historical perspective of sequencing technologies. Overview of modern sequencing technologies. Sanger Sequencing. Next Generation sequencing platforms. Whole genome sequencing.	4
2	**Next Generation Sequencing Data analysis:** Data acquisition and base calling. Quality of sequencing data. Read mapping and genome assembly. Structural and functional annotation of genomes. Statistics and algorithms used in different steps in data analysis.	10
3	**Technologies for Transcriptomics and Regulatory Genomics:** Chip-seqAnlysis. Peak finding. Motif Discovery. RNA-seq Analysis. Differential gene expression analysis. Exome sequencing and analysis. Exome sequencing.	9
4	**Software and pipelines for NGS Data Analysis:** Chip-seq analysis Piplines. RNA-seq analysis pipelines. Software used for assembly and differential gene analysis. Basics of Genome Browsers. Annotation pipelines.	9
5	**Genome Sequencing and Applications in Genetics Studies**: Algorithms and application in studying regulation of gene expression. Emerging technologies of single cell gene expression analysis. Metagenomics. Variant detection. Time series analysis. Pathway Analysis.	10
Total lectures		**42**

Suggested Text Book(s):

1. Genomic Data Analysis by Megahed Mohammad, LAP Lambert Academic Publishing
2. Deep Sequencing Analysis by Noam Shomrom, Springer.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	2	1	2	2	2	2	1	2	2	2	2
CO-2	1	2	1	2	2	2	2	2	2	2	1	2
CO-3	2	3	3	3	3	2	3	2	2	1	2	2
CO-4	2	3	3	3	3	2	3	2	2	1	2	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Prestressed Concrete Design

COURSE CODE: 12M1WCE231

COURSE CREDITS:

CORE/ELECTIVE: ELECTIVE

L-T-P:

Pre-requisite: Mechanics of Solids and Design of Concrete Structures

Course Objectives:

1. To impart knowledge on basic concepts about pre stressing and how pre stressed concrete is different from normal cement concrete
2. To impart knowledge about analysis of pre stressed members for flexural. Different methods correlation
3. Losses in Pre stress part I, Losses in Pre stress part II and Losses in Pre stress part III
4. To learn how to design pre stressed concrete members.
5. Calculation of deflection and crack width.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the concepts of pre-stressing in concrete structures and identify the materials for pre-stressing.	Familiarity
CO-2	Analysis of different types of Pre-stressed Concrete sections	Assessment
CO-3	Estimate losses of pre-stressing.	Assessment
CO-4	Design of pre-tensioned and post tensioned girders for flexure and shear	Assessment
CO-5	Design continuous pre-tensioned and post tensioned beams	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Pre stressed Concrete:** Basic concepts, Brief History and Development of building Materials. Types of Pre stressing, different definitions, Advantages and Limitations, types of pre stressing. Pre tensioning System and devices, stages, advantages and disadvantages, Devices manufacturing of railway sleepers. Post tensioning system and devices, stages, advantages and disadvantages, devices, Manufacturing of post tensioning bridge girders. Pre stressing steel, forms, types properties and codal provisions.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Analysis of prestressed members for flexure:** Flexural strength – Simplified procedures as per codes. Analysis of member under axial load, at transfer, at service conditions, permissible stress, assumptions, variations of internal forces. Analysis of flexural members based of stress concept. Analysis of flexural members based of force concept. Analysis of flexural members based on load balancing concept. Numerical solving.	10
3	**Losses in prestress:** Losses in Prestress part I, why losses are to be considered, Elastic shortening. Losses in Prestress part II, Difference between losses in pre tensioning and post tensioning, friction loss, and anchorage slip. Losses in Prestress part III, Creep of concrete, steel relaxation, shrinkage of concrete, time dependent losses.	6
4	**Design of Prestressed Concrete members:** Design of sections for flexure part I, Design of sections for flexure part II and Design of sections for flexure part III.	10
5	**Calculation of deflection and crack width:** Calculation of deflection, total deflection, limits as per IS Code, span to depth ratio, Numerical solving. Calculation of crack width, Different methods, limits of crack widths.	8
Total lectures		42

Suggested Text Book(s):

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi,1998.
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co.Pvt. Ltd.1997.
3. Rajagopalan, N, —Prestressed Concretel, Alpha Science,2002

Other useful resource(s):

1. Link to NPTEL coursecontents:https://nptel.ac.in/courses/105106117/
2. Link to topics relatedtocourse:
   i. https://nptel.ac.in/courses/105106117/1
   ii. https://nptel.ac.in/courses/105106117/2
   iii. https://nptel.ac.in/courses/105106117/4
   iv. https://nptel.ac.in/courses/105106117/6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Design of Prestressed Concrete Structures)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.75
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.75
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.08
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	1.75
Average	**2**	**2.5**	**2.5**	**2.5**	**2.5**	**1**	**1**	**1**	**2**	**2.25**	**1.5**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Process Design in Environmental Engineering

COURSE CODE – 14M31CE214

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Treatment technologies in water, waste water management

Course Objectives:

1. To educate about the structural design principles
2. To educate the students on aspects of water retaining structures design
3. Educating the design of masonry and steel structures used in environmental engineering

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Ability to apply the principle of limit state design.	Familiarity
CO-2	Ability to do the structural design of a complete water and wastewater treatment plant.	Assessment
CO-3	Ability to do air pollution control devices design	Usage
CO-4	Ability to design underground water storage structures	Usage

Course Contents:

Unit	Contents	Lectures required
1	INTRODUCTION AND DESIGN OF PIPES: Environmental Engineering structures - Introduction -Concept of elastic method, ultimate load method and limit state method – Advantages of Limit State method over other methods – Limit State philosophy as detailed in current IS Code.	4
2	Structural design of - Concrete, Prestressed Concrete, Steel and Cast-iron piping mains, - anchorage for pipes - massive outfalls, Advances in the manufacture of pipes	6
3	Reactor Analysis (objectives, basis), Reactor types(complete mix batch reactor, complete mix continuous stirred reactor, PFR, PFR with dispersion, MFR, CFSTR, CFSTR in series).	2
4	Design of water filter plant (RS Gravity filter and under drainage system, wash water trough, ASP, TF	6
5	Basics of hydraulic loading, organic loading, design of aeration system, design of nitrification and gentrification reactor	4
6	Process of reverse osmosis and membrane filtration ,design of anaerobic system (including UASB)	2
7	Low-cost treatment systems (suspended growth culture system like OD, OP and A Land attached growth system like RBC)	4
8	Design of stabilization pond (aerobic, facultative, anaerobic)	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
JUIT WAKNAGHAT

9	Design of aerated lagoon, Design of oxidation ditch, design of RBC, design of combined system(activated Bio filter, TF followed by solids contactor, RF followed by an ASP, Bio filter followed by an ASP, TF followed by an ASP)	8
Total lectures		**42**

Suggested Text Book(s):

1. Krishna Raju N., "Advanced Reinforced Concrete Design", CBS Publishers and Distributors, New Delhi, 1988.
2. Rajagopalan K.,"Storage structures", Tata McGraw Hill, New Delhi, 1989
3. . Green, J.K. and Perkins, P.H., "Concrete liquid retaining structures", Applied Science Publishers, 1981
4. Weber, W.J and Di Giano, F.A., "Process Dynamics in Environmental systems", John Wiley sons Inc, 1996

Suggested Reference Book(s):

1. H. Peavy, D. Rowe, G.Tchobanoglous "Environmental Engineering", IstEdition, McGraw Higher Education Publications, India, 2017.
2. Metcalf and Eddy, "wastewater engineering, treatment, disposal and Reuse", Inc. Third edition McGraw – hill 1991.
3. Dunn I.J, Elmar Heinzle, John Ingham, Prenosil J.E, „Biological reaction engineering", Wiley inter science, 2005.

Other useful resource(s):

1. Process Chemistry for water and wastewater treatment: Benefield L.D., Judkins J.F., Weand B.L., Prentice-Hall Inc, 1982.
2. Microbiology for Environmental Scientists and Engineers, Gaudy Jr. A.F. and Gaudy E.T., McGraw Hill Book Company, New York,1980
3. Standard Methods for the Examination of water and wastewater: APHA, WPCF,2005

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (10) - 10 Presentation(1) -10 Attendance/Quiz -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Process design in environmental engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**1.75**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2.00**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.08**
Average	**2.00**	**2.50**	**2.50**	**2.50**	**2.50**	**1.00**	**1.00**	**1.00**	**2.00**	**2.25**	**1.50**	**2.00**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

QC Analysis and Management

COURSE CODE

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: B Tech

Course Objectives

1. The Objective of the course is to make the student aware of quality control techniques and process for routine analysis of various biotech and pharmaceutical products. They will learn design of QC laboratory for chemical, instrumental and microbiological analysis.

Course Outcomes

Sr. No.	Course outcomes	Level Attainment
CO I	To understand concept of quality control & importance of quality control of various biotechnological products	Familiarity
CO II	Able to design and prepare quality sheets for various process	Familiarity
CO III	Able to learn quality control guidelines for maintaining various equipment and process used in biotech industry	Assessment
CO IV	To understand various validation process involved in R& D industry	Usage
CO V	To be able to use quality tools to prepare process control chart	Usage

Topic Covered

Unit no.	Contents	Contact Hrs.
1	Evaluation of quality control, Quality Control & Quality Assurance, Using Quality Assurance for the Best Results; The Role of Inspection in Quality Control, Collecting Your Quality Data; Quality Models in business, Six Sigma Concept, Six Sigma tools, Continuous improvements and its applications, Lean concept for Process Improvements Ten Steps for Incorporating Quality into a New Product and/or Process; Quality Management: Practices, Tools, and Standards	4
2	Statistics Process control: control chart for variable and attributes, P charts C charts, Chebychew's in equations and normal distribution curve, Sampling plan and characteristics of OC curves,	3
3	Quality Control techniques for routine analysis with HPLC: Quality control aspects of Pharmaceuticals and Food products, Quality control aspects of Bioactive natural products, QC Monoclonal antibody products QC rDNA products ,	20
4	Quality control laboratory: Design of QC laboratory for chemical, instrumental and microbiological analysis. Good Practices in QC laboratory, Schedule L1, standardization of reagents, labeling of reagents, control, samples, controls on animal house, data generation and storage, QC documentation, LIMS Environmental monitoring, setting of limits and its evaluation, Control of	10

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	contamination and cross contamination. Stability Studies, ICH Guidelines, WHO Guidelines Waste disposal, disposal procedures and records, current regulations for waste disposal Contract manufacturing and analysis	
5	QA Lot release, non-conforming material review, failure reviewQC Lot release testing –chemical assays & bioassays QC Raw material testing, in-process testing, validation support QA Audit procedures and vendor certification Handling out-of-specification results	5
	Total	42

TEXT BOOKS

1. Fundamentals of Quality control and improvement by Ämitav Mitra A John Wiley & Sons, Inc., Publication
2. Good Manufacturing Practices for Pharmaceuticals by Sidney H Willig, Marcel and Dekker
3. Quality Assurance in Environmental Monitoring by
   P. Quevauviller, Wiley VCH

Bioactive Natural Products: Quality Control & Standardization by V.K.Gupta, s.c. Taneja and B.D. Gupta, Studium Press LLC, U.S.A.

Evaluation Scheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered upto T-1
T2 Test	25	1.5 hrs.	Syllabus covered upto T-2
End Term Test	35	2 hrs.	Entire Syllabus
Teacher Assessment	25	Entire Sem	Based on Assignments, quizzes etc.

Approved in Academic Council Meeting held on 28 July, 2021
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Quality Management

COURSE CODE: 18B1WHS631

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Understand the importance of quality in an organisation's success.
2. Learn to define quality of products and services in operational terms using standard parameters.
3. Learn various techniques and principles such as quality function deployment, Taguchi method, service quality management, quality audits and Six Sigma used in quality creation and maintenance.
4. Apply the techniques and principles in organizational settings.
5. Synthesise the knowledge gained on quality management to design appropriate quality systems in organizations.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.	Familiarity
CO-2	Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.	Assessment
CO-3	Critically appraise the organisational, communication and teamwork requirements for effective quality management	Usage
CO-4	Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans	Usage

Course Contents

Unit	Contents	Lectures required
1	**The Engineer and QM Link** Introduction The engineer as a specialist The failure of engineering: educational systems: The UK experience The new breed of engineers Engineers' competences and the role of QM The evolution of engineers for Total Quality Management The engineer in a QM environment	2
2	**Pioneers of QM:** How old is the quality concept? Why are the Japanese leading the field of quality? How the West has woken up to the importance of quality WE Deming ,Joseph M Juran , Philip B Crosby , Armand V Feingenbaum ,Bill Conway ,Kaoru Ishikawa, Genichi Taguchi , Shigeo Shingo, W G Ouchi	3
3	**Total Preventative Maintenance for QM** Introduction What is quality? Some quality characteristics The quality processes What is meant by Quality Control? What is meant by Statistical Quality Control? What is meant by Total Quality Control? What is meant by Quality Assurance? What is meant by Quality Management? Some examples of QM models : QM - a boardroom place QM and productivity QM and Advanced Manufacturing Technology	3
4	**The meaning of quality systems:** Why are Quality Assurance systems needed? The role of quality standards. The different stages of a quality assurance	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	system. The implementation of quality systems. The ISO 9000 quality system British Standard BS 5750/IS0 9000. Registration a n d accreditation in quality systems	
5	**QM: Tools and Techniques:** Introduction . Why use tools and techniques in QM? How do we define processes? Process variation and its causes . What are the tools and techniques for QM? Process capability. The implementation of Statistical Process Control	4
6	**Total Preventive Maintenance:** Introduction, What is TPM? Failure patterns. Costs and benefits of TPM Some examples of TPM implementation Towards Zero Defect: Zero Breakdown Implementing TPM: Some guidelines	3
7	**Continuous Process Improvement:** Juran Trilogy, Improvement Strategies , Types of Problems, The PDCA cycle, Problem solving Methods, Kaizen, Reengineering	4
8	**Leadership And Strategic Planning:** Leadership theory and practices, Creating the leadership system, Strategic Planning, leadership, strategy and organization structure, leadership for Quality ; The Seven Management And Planning tools.	4
9	**Essentials of QM:** Introduction Internal customer-supplier chains External customer - supplier chains From customer satisfaction to customer commitment- from a win-lose to a win-win situation Towards single sourcing supplier chains The power of communications in customer-supplier chains.	3
10	**Principles of Six Sigma:** The statistical basis of Six Sigma ; Six Sigma Problem Solving (The DMAIC Methodology); Tools and Techniques; Design for Six Sigma Six sigma in services and small organizations Six Sigma and Lean Production Lean Six sigma and Services	3
11	**Benchmarking:** Define benchmarking, Reasons to benchmark Process, Deciding what to Benchmark, Pitfalls and criticism of Benchmarking	5
Total Lectures		42

Suggested Text Book(s):

1. Evans's. James, Lindsay M. William , The Management and Control of Quality, 8th Edition, Cengage Learning, 2011
2. Dale H. Besterfield, Total quality Management, Pearson Education, 2011

Suggested Reference Book(s):

1. H. Lal, Lt. Gen , Total Quality Management , Wiley Eastern Limited, 1990 ,
2. Bounds Greg , Beyond Total Quality Management, McGraw Hill,
3. Kanishka Bedi, Quality Management, Oxford Higher Education.

Other useful resource(s):

1. www.evans.swlearning.com
2. www.cengage.com/international

Evaluation Scheme:

S.No.	Exam	Marks	Duration	Coverage / Scope of Examination
1.	Test 1	15	1 Hour	Syllabus covered upto T-1
2.	Test 2	25	1.5 Hour	Syllabus covered upto T-2
3.	Test 3	35	2 Hours	Entire syllabus
4.	Teaching Assessment	25	Entire Semester	Case Study(4) -10 Presentation/ Assignment(1)- 10 Attendance- 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Quality Management)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	2	1	0	0	1	3	3	3	1.83
CO-2	2	3	3	3	2	0	0	0	2	3	3	3	2
CO-3	3	3	3	3	3	0	0	0	2	3	3	3	2.17
CO-4	3	3	3	3	3	0	0	0	2	3	3	3	2.17
Average	2.5	3	2.75	2.75	2.5	1	0	0	1.75	3	3	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

SERVICE DESIGN AND MARKETING

COURSE CODE: 20B1WHS631

CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Understand the concept of services design and service marketing
2. Comprehend the emergence of marketing thought in the services economy
3. Appreciate the reasons for a distinctive marketing approach for services
4. Ability to design and operate an effective service system.
5. Identify professional and career opportunities in the services sector

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Examine the nature and Importance of services, and distinguish between the design of products and services	Familiarity
CO-2	Develop an understanding of the dynamics of Services sector in Indian economy and the opportunities thereof.	Assessment
CO-3	Identify the major elements needed to improve the design and marketing of services	Assessment
CO-4	Develop an understanding of the roles of relationship marketing and Service quality management.	Assessment
CO-5	. Identify the distinctive behavior patterns of consumer's relationship management.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Services Marketing: Differentiating Goods from Services, Characteristics of Services, The Growth of the Services Sector, Career Opportunities in the Services Sector	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	Marketing Management: Core Concepts, Goods Marketing Versus Services Marketing	4
3	The Services Sector in the Indian Economy: Introduction, Reasons for the Growth of Services in India, Key Services Businesses in India	4
4	Services Strategy: Introduction, The Process of Strategic Planning, A Market-oriented Service Strategy, Strategy Evaluation and Control	4
5	Market Segmentation: Introduction, Bases for Market Segmentation, Criteria for Market Segmentation, Differentiability, Stages in Market Segmentation	4
6	Competition Analysis and Strategies: Introduction, Competitive Threats, Competition from the Industry Perspective, Competition Analysis, Competition Strategies	4
7	Service Demand Management: Introduction, Demand Situations, Demand Patterns, Demand Management	3
8	The Service Product: Service Product Classification: The Consumer's Perspective, The Development of a New Service, The Service Product Mix, Service Differentiation	4
9	Service Branding and Positioning: Introduction, Service Branding, Choosing Brand Elements, Benefits of Branding	3
10	Service Quality Management: Introduction, How is Service Quality Perceived, Determinants of Service Quality, The Process of Service Quality Management, SERVQUAL, Total Quality Services Marketing	3
11	Service Failures and Recovery: Introduction, Reasons for Customer Grievances, Customer Response to Service Failures, Complaint Management, Service Recovery	3
12	Customer Relationship Management: Introduction, Benefits of CRM, Three Drivers of Successful CRM, A CRM Framework	3
		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

S.No.	Name of Books	Remarks
1	Services Marketing Kindle Edition by K. Rama Mohana Rao (Author)	
2	Services Marketing: People, Technology and Strategy	

Suggested Reference Book(s):

S.No	Name of Books	Remarks
1	Services Marketing: Global Edition by Christopher Lovelock, Jochen Wirtz published by Pearson	
2	Service Management and Marketing: Customer Management in Service Christian Grönroos	
3	Professional Services Marketing: How the Best Firms Build Premier Brands, Thriving Lead Generation Engines, and Cultures of Business Development Success John Doer	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Class Performance– 10 Assignments-10 Attendance – 5

Department of Humanities and Social Sciences

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Soft Computing Techniques

COURSE CODE: 18B1WEC851

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Comprehend the fuzzy logic and the concept of fuzziness and concepts of neural networks	Familiarity
CO-2	Demonstrate knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic	Assessment
CO-3	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications	Assessment
CO-4	Apply fuzzy rules and neural network learning rules and design paradigms to solve engineering and other Problems.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to fuzzy set theory: Probabilistic reasoning, Fuzzy sets, mathematics of fuzzy set theory, operations on fuzzy sets, comparison of fuzzy and crisp set theory.	4
2	Fuzzy mapping: one to one mapping, max-min principle, extension principle, implication rules – mamdani implications. Membership functions: Universe of discourse, mapping inside fuzzy domain, fuzzy membership mapping methods, and application to real world problems.	10
3	Artificial Neural Networks (ANN) and their biological roots and motivations. Comparison Between Artificial and Biological Neural Networks, Applications of Neural network. Network Architecture ,Taxonomy of neural networks: feed forward and recurrent networks with. Merits and limitations of neurocomputing.	8
4	Types of learning, supervised and unsupervised learning laws . Learnig Laws : Hebb's rule, Delta rule, Widrow - Hoff (The Least-Mean-Square) learning rule, correlation learning rule, instar and outstar learning rules, Competitive learning, Credit Assignment Problem, Error Correction learning, Memory based learning.	9
5	The Perceptron and its learning law, Classification of linearly separable patterns, Multi-Layer Perceptron, Supervised Learning, Back-Propagation Learning law. Feed forward networks, Recurrent Networks.	6
6	Winner takes-all Networks, Competitive Learning, Kohonen's Self organizing Maps, Introduction to Adaptive Resonance Theory.	5
Total lectures		42

Suggested Text Book(s):

1. Simon Haykin: Artificial Neutral Networks, 2nd Edition, Pearson, 2008.
2. Yegna Narayanan: Artificial Neural Networks, 2nd Edition, Prentice-Hall of India, 2010.
3. S.N. Sivanandam, S.N Deepa: Principles of Soft Computing, 3rd Edition, Wiley, 2019.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Reference Book(s):

1. Bart Kosko: Neural Network and Fuzzy Systems: A Dynamic System Approach to Machine, Prentice-Hall 1998
2. L. Fausett: Fundamentals of Neural Networks: Architectures, Algorithms, and Applications, Prentice-Hall, Reprint 2013
3. Jack M. Zurada: Introduction to Artificial Neural Systems, PWS Publishing Co., 2nd Edition, 2002.

Other useful resource(s):

Link to NPTEL course contents

1. http://nptel.ac.in/courses/117105084/
2. http://nptel.ac.in/courses/108104049/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Soft Computing Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	3	2	1	1	1	2	2	2	1.92
CO-2	3	2	3	3	3	1	1	1	1	2	2	2	2.00
CO-3	3	2	3	3	3	2	1	1	1	2	2	2	2.08
CO-4	3	3	3	3	3	2	3	1	1	3	3	3	2.58
Average	3	2.25	2.75	2.75	3	1.75	1.5	1	1	2.25	2.25	2.25	2.15

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Software Reliability

Course Code: 18B1WCI834
Course Credits: 3-0-0
Instructor: Sh. Prateek
Elective: CS/IT

Course Outcomes (COs):

Sr No	Course Outcomes	Level of Attainment
CO-1	To have an understanding of the terminology, the process of the software reliability Engineering	Familiarity
CO-2	To understand the various models of software reliability	Assessment
CO-3	To understand the metrics used for software reliability and maintainability	Assessment
CO-4	To understand the fault detection and correction approaches used in developing a quality software	Assessment
CO-5	To understand the design principles for achieving higher reliable software system.	Assessment
CO-6	To know how to improve reliability during the various stages of the software development life cycle	Assessment

Course Outline:

Modules	Contents	Lectures required
Module-1	Overview of software reliability engineering • Introducing the course. • What is software reliability? • What factors affect software quality? • What is software reliability engineering? Software Size • Software size • Size: Length (code, specification, design) • Size: Reuse • Size: Functionality (function point, feature point, object point, use-case point) Size: Complexity	6
Module-2	Software Cost and Effort • Software cost model • COCOMO and COCOMO II • Constraint model • Software lifecycle management (SLIM) • Cost models: advantages and drawbacks	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Software Quality • Software quality • Software quality models: Boehm model, McCall model, ISO 9126 model, etc. • Software quality standards and metrics • Measuring customer satisfaction • Software quality assurance (SQA) • Software quality management	
Module-3	Overview of Software Reliability Engineering • Hardware and software reliability • The SRE process System reliability • System reliability • Reliability Block Diagram (RBD) • Serial and parallel configuration • Active redundancy • Hazard analysis: FMEA, FTA	**8**
Module-4	Strategies to meet reliability objective • Fault prevention strategy: software product and process improvement using ISO 9000-3. • Introducing fault tolerance concepts and definitions. Coincident, correlated and dependent faults. • Fault tolerance phases. • Recovery block mechanism and Acceptance testing. • Exception handling, expected and unexpected events. • Construction of robust software systems. • Defensive programming, dual software technique. • Adjudication by voting. • Recovery blocks, N-version programming, Consensus recovery block, Acceptance voting, N self-checking programming.	**6**
Module-5	Developing operational profiles • Defining function, operation, run, run type, operational mode, operational profile. • Representation of operational profile. • Procedure to define operational profile. • Create functions/operations list. • Determine occurrence rate of individual operations. • Determine occurrence probabilities.	**8**
Module-6	• Preparing and executing test • Software reliability tools • Applying failure data to guide decisions • Deploying software reliability engineering • SRE for Agile development • Clean room software development	**8**
	Total	**42**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-PO Articulation												
Srl	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	2	2	1	2	1	2	1	1	1	0	0	1
CO-2	3	3	3	3	2	3	2	1	2	0	0	2
CO-3	3	3	3	3	2	3	2	1	2	0	0	2
CO-4	3	3	3	3	2	3	2	1	2	0	0	2
CO-5	3	3	3	3	2	3	2	1	2	0	0	2
CO-6	3	3	3	3	2	3	2	1	2	0	0	2
%	89	83	72	61	67	83	56	78	0	0	0	67

CO- PSOs Articulation					
Sr No	PSO-1	PSO-2	PSO-3	PSO-4	
CO-1	2	2	2	2	79
CO-2	3	3	3	3	79
CO-3	3	3	3	3	81
CO-4	3	3	3	3	75
CO-5	3	3	3	3	79
CO-6	3	3	3	3	79
Average Score	81	82	85	76	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Software Testing Fundamentals (Theory)

Course Name: SOFTWARE TESTING FUNDAMENTALS

Course Code: 18B1WCI633
Course Credit: L 2 T ___ P 1

Course Pre-requisites (if any): C/C++, Python, Eclipse, Netbeans

Course Objectives:

1. Employ correct testing terminology throughout the testing process
2. Execute specific software tests with well-defined objectives and targets.
3. Modeling techniques: UML: FSM and Statecharts, Combinatorial design; and others.
4. Apply various testing techniques, including domain, code, fault, usage and model-based.
5. Perform a complete testing process, taking into account practical considerations.

Detailed Course Contents:

Module	Contents	Lectures required
Module 1	**Introduction:** Error, Fault, Failure, Test automation and the importance of testing, Developer and tester as two roles, Principles of Testing, ETVX Model, Testing Maturity Model, V-Model, Software quality, Testing and debugging (preparing, Constructing, Executing, Specifying, Assessing a test plan), test Generation Strategies, Types of testing and Classifiers C1, C2, C3, C4, and C5, Static testing **Preliminaries mathematical:** Predicates and Boolean Expressions, Control Flow Graph, Program Dependence Graph, Strings languages and regular expressions,	6
Module 2	**Test Generation:** a) **From Domain Partitioning:** The test selection problem, Equivalence partitioning, Boundary value analysis, Category-partition method, Cause-effect graphing. b) **From Finite State Models**: Finite State machines, Conformance testing, A Fault model, Characterization Set, The w-Method, The partial W-methos. c) **From Combinatorial design**: Combinatorial designs, A combinatorial test design process, Fault model, Latin Squares, Mutually orthogonal Latin squares, Pairwise designs: binary factors, Pairwise design: multi-valued factors, Orthogonal Arrays.	10
Module 3	**Test Adequacy Assessment and Enhancement:**	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	a) **Using Control flow:** Test adequacy basics, adequacy criteria based on control flow – Statement coverage, Decision coverage, condition coverage, MCC, LCSAJ, basis path coverage, b) **Using data Flow:** Definitions, C-use, p-use, Data flow graphs, du-path, dc-path, c-use coverage, p-use coverage, All-use coverage, k-dr chain coverage. c) **Using Mutation:** Mutation and Mutants, Test Assessment using mutation, Mutation operators, Founding principles of mutation testing, Equivalent mutants, Fault detection using mutation, Types of mutants.	
Module 4	**Phases of testing I:** **Regression testing:** Regression test process, Regression test selection, Selecting regression tests, test selection using execution trace, test selection using dynamic slicing	**4**
Module 5	**Phases of testing II:** Unit Testing, Integration Testing, System testing, Acceptance testing.	**4**
	TOTAL LECTURES	**32**

Suggested Text Book(s):

1. **"Foundations of Software testing," 2nd edition by Aditya P mathur, Pearson 2013**
2. **"Practical Software testing," 8th edition by Ilene Burnstein, Springer 2010**

Suggested Reference Book(s):

1. Paul C. Jorgensen, Software testing: a Craft's man approach, CRC Press
2. Srinivasan Desikan and G. Ramesh, Software Testing: Principles and Practices, Pearson Education
3. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.
4. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
5. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
6. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
7. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
8. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2003.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106105150/
2. Link to topics related to course:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

a. https://www.guru99.com/software-testing.html
b. **https://www.inf.ed.ac.uk/teaching/courses/st/2011-12/Resource-folder/**

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

***Internal Marks Breakdown:**

Assignments	10 marks (3x3)
Quizzes	10 marks (4 quizzes)
Attendance/Regularity	5 marks

Course outcomes:

S.NO	Course outcomes (Software Testing Fundamentals) (XXXXX)	Level of Attainment
CO-1	Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.	Familiarity
CO-2	Implement various test processes for quality improvement.	Assessment
CO-3	Design test planning and manage the test process.	Assessment
CO-4	Apply the software testing techniques in commercial environment.	Assessment
CO-5	Design test adequacy assessment and enhancement criteria.	Assessment
CO-6	Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.	Usage

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-1	H	H	H	M	M	H	M	M	M	H	L	H	81%
CO-2	H	H	H	M	H	M	H	M	M	H	L	H	77%
CO-3	H	H	H	M	M	H	L	M	H	H	L	H	85%
CO-4	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-5	H	H	H	M	H	H	M	M	H	H	L	H	85%
CO-6	H	H	H	M	H	H	M	M	M	H	L	H	85%
Weightage	100%	100%	100%	70%	70%	80%	60%	90%	83 %	84%	70%	100%	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • A&G

Software Testing Fundamentals Lab

COURSE CODE: 18B1WCI673

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: Object Oriented Analysis and Design with UML, Software Engineering, Software Metrics, Basics of Mathematics.

Course Objectives:

1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
5. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Have an ability to apply software testing knowledge and engineering methods.	Familiarity
CO-2	Have an ability to design and conduct a software test process for a software testing project.	Usage
CO-3	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	Assessment
CO-4	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.	Assessment
CO-5	Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.	Usage
CO-6	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems.	Usage
CO-7	Have an ability to use software testing methods and modern software testing tools for their testing projects.	Usage

List of Experiments:

S. No	Description	Hours
1	Revision of Java coding using Eclipse	2
2	Developing Black box test cases 1: a) Using Boundary Value Analysis	2
3	Developing Black box test cases 2:	
	a) Using Equivalent Classes	2
4	Developing Black box test cases 3: a) Using DecisionTables	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Developing WhiteBox test cases 1: a) Performing Path testing	2
6	Developing WhiteBox test cases 2: a) Performing orthogonal testing	2
7	Developing WhiteBox test cases 3: a) Performing Coverage Analysis	2
8	Mutation testing and developing Mutants	2
9	Regression testing and Developing Regression test Cases	2
10	Performing GUI testing for a designed application	2
11	Performing Load testing for a designed application	2
12	Getting familiar with Profiler and performing CPU, Memory analysis in real time	4
Total Lab Hours		26

Suggested Books/Resources:

1. 1. A Practitioner"s Guide to Software Test Design, Lee Copeland, 2003,
2. The Art of Software Testing, 2nd edition, Glenford Myers, et. el., 2004
3. Software Testing Techniques, 2nd edition, Boris Beizer, 1990
4. How to Break Software: A Practical Guide to Testing, James Whittaker, 2002.
5. Testing Object-Oriented Systems: Models, Patterns, and Tools, Robert V. Binder, 1999.
6. Software Testing and Quality Assurance: Theory and Practice Paperback – 2010

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	2	2	3	3	3	2	3	2	2	2.5
CO-2	3	3	3	2	3	3	3	3	2	3	2	3	2.8
CO-3	3	3	3	2	2	3	3	3	3	3	2	2	2.7
CO-4	3	3	3	3	3	3	3	2	2	3	3	3	2.8
CO-5	3	3	3	2	2	2	3	3	3	3	2	2	2.6
CO-6	3	3	3	3	3	3	3	2	2	3	3	3	2.8
CO-7	3	3	3	3	3	3	2	2	3	3	3	3	2.8
Average	3	2.9	3	2.4	2.6	2.9	2.9	2.6	2.4	3	2.4	2.6	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Solid Mechanics in Structural Engineering

COURSE CODE:12M1WCE211

COURSE CREDITS: CORE/ELECTIVE:

CORE L-T-P:

Pre-requisite: Engineering Mechanics

Course Objectives:

1. To impart the knowledge of mechanics of deformable bodies under static loads including temperature variation
2. To teach students the development of strains & stresses in solids and their relationships
3. To develop knowledge of behavior of structural members (beams, columns, shafts, etc.) under loading and draw bending moment and shear forces diagram of members for different loading.
4. To impart knowledge of methods used to compute slope and deflections in beams under transverse loads.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	At the end of the course students will have knowledge of various stress and strain systems, their relationships and behavior of materials under loads.	Assessment
CO-2	The students will develop concept of complex stresses and their treatment to find maximum value of a stress.	Assessment
CO-3	Students will develop understanding of how various forcing functions (shear force, bending moment and torque) vary along a structural element and be able to plot the same.	Assessment
CO-4	The students will be able to analyze a structural member (beams, columns, shafts, etc.) in depth with determination of crucial stresses, strains and deformation characteristics.	Assessment
CO-5	The students will be able to use the subject knowledge to decide failure locations in a solid body subjected to different types of loading.	Assessment

Department of Civil Engineering

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Mechanics of Deformable Solids:** Definition of stress and strain. Hooke's law for axial loads. Constants of elasticity: Young's modulus, shear modulus, Poisson's ratio.	7
2	**Axial load:** Calculation of stress and strain, design of bars for axial load. Statically indeterminate structures. Thermal effects on axial deformation and geometric —misfitsl. Shear stress and shear strain. Bars of uniform, varying and tapering cross sections, composite bars.	5
3	**Torsion of circular bars:** Computation of shear stress, Hooke's law for shear; design of circular bars. stress distributions in beams.	3
4	**Complex Stresses:** Stresses on inclined planes, principal stresses and strains, Mohr's circle of stresses, theories of elastic failure. Generalized Hooke's law for isotropic materials.	6
5	**Shear Force and Bending Moment Diagram:** Relationships between loads, shear force and bending moment. Shear force and bending moment diagram for different beams and their application.	5
6	**Bending Stress:** Flexural stress in linearly elastic beams; design of beams for strength; differential equations of the deflection curve; computation of slope and deflection; unsymmetrical bending	6
7	**Slope and deflection of beams:** Differential equation of the deflection curve, double integration method, Macaulay's method, moment area method and conjugate beam method.	7
8	**Buckling of columns:** The ideal pin-ended column; Euler buckling load; the effect of end conditions on column buckling.	3
Total lectures		**42**

Suggested Text Book(s):

1. Beer , Johnston, Dewolf, Mazurek,Sanghi:Mechanics of Materials, 7th Edition, McGraw Hill Education India Private Limited,2017
2. Shames Irving H: Introduction to Solid Mechanics, 3rd Edition, Prentice Hall India Learning Private Limited,2002.
3. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain: Mechanics of Materials, Laxmi Publications; Revised edition(2017)

Suggested Reference Book(s):

1. Russell C. Hibbeler: Static and Mechanics of Materials, 5th Edition, Pearson,2018.
2. William Nash: Schaum'sOtline of Strength of Materials, 6th Edition, McGraw Hill EducationIndia Private Limited,2013

Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/105102090/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Mechanics of Solids)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	1	2	3	2	2	3	**2.4**
CO-2	3	3	3	3	2	2	1	2	3	2	2	2	**2.3**
CO-3	3	3	3	2	2	2	1	2	2	2	2	3	**2.2**
CO-4	3	3	3	2	2	1	1	2	3	3	2	2	**2.2**
CO-5	3	2	3	3	3	1	1	3	3	3	3	2	**2.5**
Average	**3**	**2.8**	**3**	**2.6**	**2.2**	**1.6**	**1**	**2.2**	**2.8**	**2.4**	**2.2**	**2.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Department of Civil Engineering

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

S No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Avg
CO-1	3	2	3	1	2	3	3	2	1	2	2	2	2.2
CO-2	3	3	3	1	2	3	3	3	2	2	2	2	2.4
CO-3	3	3	3	1	2	3	2	3	2	2	3	3	2.5
CO-4	3	3	3	3	2	3	3	2	2	2	3	3	2.7
CO-5	3	3	3	2	2	3	3	3	2	2	3	3	2.7
CO-6	3	3	3	2	2	2	3	2	2	2	2	2	2.3
CO-7	3	3	3	2	2	2	2	2	2	2	3	2	2.3
CO-8	3	3	3	3	2	3	3	2	2	2	3	3	2.7
CO-9	3	3	3	3	2	3	3	3	2	2	3	2	2.7
Avg	3	2.9	3	2	2	2.8	2.8	2.4	1.9	2	2.7	2.4	2.5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • ABOVE

Game Development Lab

COURSE CODE: XXX
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2
Pre-requisite: Introduction to Computer Programming C ,C++, Matlab
Course Objectives:

1. To strengthen their problem-solving ability by applying logic & numerical approach.
2. To strengthen the ability to design and represent solutions to problems using Nash Equilibrium and saddle points.
3. To introduce the 2-Person, N-Person Game, Mixed Strategy, Convex Combination

Course Outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To explain how the game is implemented through a matrix representation	Familiarity
CO-2	To analyze and decompose the problem into matrix & propose the various solutions using Nash Equilibrium, Mixed Strategy.	Assessment
CO-3	To design the game for 2-person, N-person e.g. Puzzle Game, Chess Board,8 Queen Game	Assessment

List of Experiments

S.No.	Description	Hours
1	There are 100 bankers lined up in each of 100 rows. Pick the richest banker in each row. Javier is the poorest of those. Pick the poorest banker in each column. Raoul is the richest of those. Who is richer: Javier or Raoul	2
2	Implement Mixed Strategy Problem & find out the expected payoff	2
3	Implement the Mixed strategy Problem and find the saddle point for finite & infinite user	2
4	Consider the game with matrix $\begin{bmatrix} 3 & -2 & 4 & 7 \\ -2 & 8 & 4 & 0 \end{bmatrix}$. Solve the game, find the best response for player1 to the strategy $(\frac{1}{4}, \frac{1}{2}, \frac{1}{8}, \frac{1}{8})$. What is 2nd best response to 1st best response?	2
5	Consider the game	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	$\begin{matrix} 1 & -3 & -5 & 1 \\ 0 & 4 & 4 & -2 \\ 0 & 0 & 8 & 3 \\ 0 & 0 & 0 & 50 \end{matrix}$ Solve this game by finding v(A) and the optimal strategies.	
6	Consider the matrix for two-player $\begin{bmatrix} 1,0 & 1,3 & 3,0 \\ 0,2 & 0,1 & 3,0 \\ 0,2 & 2,4 & 5,3 \end{bmatrix}$ Find the Nash Equilibrium	**2**
7	Consider the matrix $\begin{bmatrix} 1,1 & 3,x & 2,0 \\ 2x,3 & 2,2 & 3,1 \\ 2,1 & 1,x & x^2,4 \end{bmatrix}$ Find x so that the game has exactly two pure Nash equilibrium?	**2**
8	Consider the game in which each player has two strategies Wait and Go. The game matrix is $\begin{bmatrix} 1,1 & 1-\epsilon,2 \\ 2,1-\epsilon & 0,0 \end{bmatrix}$ Find the correlated equilibria corresponding to the Nash equilibria $0<\epsilon<1$	**2**
9	Implement the prisoner's dilemma game with matrix	**2**
10	The third column of the matrix $\begin{bmatrix} 0 & 8 & 5 \\ 8 & 4 & 6 \\ 12 & -4 & 3 \end{bmatrix}$ is dominated by a convex combination. Reduce the matrix and solve the game.	**2**
11	Use dominance to solve the following game even though it has no inverse $A = \begin{bmatrix} -4 & 2 & -1 \\ -4 & 1 & 4 \\ 0 & -1 & 5 \end{bmatrix}$	**2**
12	Design the magic Square game. A Game has a matrix in which each row has a row sum that is the same as each of the column sums. For example $A=\begin{bmatrix} 11 & 24 & 7 & 20 & 3 \\ 4 & 12 & 25 & 8 & 16 \\ 17 & 5 & 13 & 21 & 9 \\ 10 & 18 & 1 & 14 & 22 \\ 23 & 6 & 19 & 2 & 15 \end{bmatrix}$	**2**
13	Design the 9×9 Sudoku puzzle game	**2**
14	Implement the chessboard for 2 users and find the optimal strategy	**2**
	Total Lab Hours	**28**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5	Attendance and discipline in lab		15
6	Total		100

Reference Books

- An Introduction to Game Theory by Martin J. Osborne
- Introduction to Game Theory by Stef Tijs Tilburg University Tilburg, Hindustan Book Agency(India)
- Games of Strategy Theory and Application by Melvin Dresher Prentice – Hall, Inc. Englewood Cliffs, N.J.

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	3	1	1	1	1	1	2	2	1.8
CO-2	3	3	3	3	3	2	1	2	2	1	2	3	2.3
CO-3	3	3	2	3	3	2	1	2	2	1	2	3	2.3
Average	3	2.8	2.5	2.8	3	1.8	1	1.8	1.8	1	2	2.8	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-4	0	3	3	3	3	3	3	2	3	3	0	3	2.4
Average	0	1.5	2	1.5	1.5	3	3	2	2.25	2.5	0	3	

Strategic Management

Course Code: 18B1WHS640
Course Credits: 3
CORE/ELECTIVE: CORE
L-T-P: 3-0-0

Pre-requisite: None

Course Objectives

1. Understand the difference between operational management and strategic management and the importance of strategic thinking.
2. Analyse the external and internal environment of an organisation and prepare a SWOT analysis.
3. Understand the strategic alternatives available to a company.
4. Learn to select the most appropriate strategic alternative w.r.t. its SWOT.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the difference between operational management and strategic management.	Assessment
CO-2	Understand the special skill set required to take strategic decisions.	Familiarity
CO-3	Understand the processes that must be put in place so that successful strategic management is practiced at all times.	Assessment
CO-4	Define the internal strengths and weaknesses of an organisation in light of the environment it is facing.	Usage
CO-5	Understand the strategic alternatives available to a company w.r.t. its SWOT.	Usage
CO-6	Learn to select the most appropriate strategic alternative.	Usage
CO-7	Analyse the environment of an organisation and be able to chart the future outlook.	Assessment
CO-8	Understand the difference between developing astrategy and putting it into action.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Defining strategy and strategic management:** An overview of strategic management and business policy.	3
2	**The General Environment:** Scanning, Monitoring and Forecasting changes in the Environment; Scenario planning; PEST analysis; SWOT analysis; General and Competitive analysis.	4
3	**The competitive environment:** Introduction; Porter's Five forces model; The value net; Strategic Groups; Hypercompetition	4
4	**The Internal Environment- Value creating activities:** Value chain analysis; SWOT analysis	3
5	**The Internal Environment- Resource based view:** Identifying sustainable competitive advantage; Knowledge Management	3
6	**Assessing Organisational Performance:** Defining performance metrics-Financial	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	Analysis; Balanced Scorecard; Benchmarking	
7	**Business Level Strategy:** Defining Business Level Strategy; Generic strategies; Resource based view; Industry Life cycle approach; Strategy and market turbulence	5
8	**Corporate Level Strategy:** Growth strategies; Diversification- related and unrelated; Implementing growth strategies; Portfolio analysis; Corporate parenting; Strategic Evaluation.	6
9	**International Strategy and Globalisation:** Globalisation; Types of international strategy; Entry mode strategies; Porter's Diamond of Competitive advantage.	4
10	**Organisational systems and strategy implementation:** Organisational structures; Organisational Processes; Strategic Control Systems; Strategic Change	2
11	**Leadership and strategy implementation:** Leadership and management;The learning organization; Emotional Intelligence and Leadership; Narcissistic Leadership; Leadership-vision, values and culture; Leading strategic Change Chaos and Innovation	3
12	**Corporate Governance:** Understand the concept of corporate governance, its significance to any organisation and the current developments in this area.	3
Total Lectures		42

Suggested Text Book(s):

1. Anthony Henry, Understanding Strategic Management, Oxford University Press, 2011

Suggested Reference Book(s):

1. Azhar Kazmi and Adela Kazmi, Strategic Management, Tata Mc Graw Hill, 2008
2. Gerry Johnson and Kevan Scholes, Exploring Corporate Strategy, Pearson Education 8th Ed., 2008

Other useful resource(s):

1. http://global.oup.com/uk/orc/busecon/business/henry2e/
2. https://www.wiziq.com/tests/strategic-management
3. http://strategyclub.com/students

Evaluation Scheme

S.No.	Exam	Marks	Duration	Coverage/Scope of Examination
1.	Test 1	15	1 Hour	Syllabus covered upto T-1
2.	Test 2	25	1.5 Hour	Syllabus covered upto T-2
3.	Test 3	35	2 Hours	Entire syllabus
4.	Teaching Assessment	25	Entire Semester	Case Study(4) -10 Presentation or Assignment(1)- 10 Attendance- 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Strategic Management)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	0	1	0	1	2	2	1	1	2	1	0	2	1.4
CO-2	0	2	1	1	0	2	0	3	2	0	1	1	1.6
CO-3	0	1	2	1	0	1	1	2	3	2	1	1	1.5
CO-4	0	2	1	2	1	1	1	0	0	2	1	2	1.4
CO-5	0	1	2	2	2	0	1	2	2	0	2	1	1.6

Approved in Academic Council held on 29.11.2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-6	0	2	3	2	3	0	1	2	2	1	2	1	1.9
CO-7	0	2	2	2	1	2	1	2	2	1	0	2	1.7
CO-8	0	2	3	2	1	1	1	2	2	3	2	1	1.8
Average	0	1.6	2	1.6	1.6	1.5	1	2	2.1	1.6	1.5	1.3	

Human Rights For Technocrats

COURSE CODE: 18B1WHS832

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Conceptual background of human rights and duties:** Definitions and classifications	2
2	**Meaning and Significance of Human Rights :** Scope of the Human Rights	2
3	**Relationship between Rights and Duties:** Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	**Universal Declaration of Human Rights: Technical background :** Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Surface Water Quality Management

COURSE CODE –14M31CE215
COURSE CREDITS: 3
CORE/ELECTIVE: ELECTIVE
L-T-P: 3-0-0
Pre–requisite: water resources, water supply engineering

Course Objectives:

1. The purpose of the course is to develop understanding of surface water quality criteria, standards, impacts of surface water pollutants and treatment methods.
2. It illustrates each unit processes, functions of the processes in surface water treatment and basic equipment that each process uses.
3. It focuses on cause and effects of surface water pollution and surface water quality degradation from range of sources.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand surface water quality criteria, and standards.	Familiarity
CO-2	To comprehend knowledge about sources, cause and impacts of surface water pollutants	Familiarity
CO-3	To be abreast with physical, chemical and biological methods surface water treatment.	Assessment
CO-4	Understanding the principles of surface water hydrology and pollution. The problem solving skills will be enhanced through the use of homework projects and an engineering project involving considerable analytical and numerical skills.	Usage
CO-5	Ability to identify, formulate and solve engineering problems, Successful completion of design project focused on surface water pollution application	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Definitions; Deterministic, phenomenological and stochastic models; modeling flow chart; Conceptual models; Simulation versus modeling	2
2	The mass balance: Definition; Batch systems and applications Completely mixed flow systems, Cells in series, Ideal plug-flow systems, Plug-flow with dispersion systems.	4
3	Model Error Assessment And Reliability: Comparison of model predictions to true values; Diagnostic checks; quantification of error; Estimation of prediction reliability.	8
4	Multi-Dimensional Systems: Total systems mass balance Two-dimensional steady-state application, Finite section approximations/finite differences.	6
5	Multi-Component Coupled Systems Models: Biochemical Oxygen Demand (BOD) – Dissolved Oxygen (DO) in streams Sediment oxygen	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

	demand.	
6	Algal photosynthesis and respiration , Lake eutrophication modeling.	4
7	Introduction to and applications of QUAL2K.	8
8	BOD-DO dynamics in dispersive systems	4
9	Ecosystem (food-web) models	4
Total lectures		**42**

Suggested Text Book(s):

1. Chapra, S.C., Surface Water-Quality Modeling, McGraw-Hill, NY, 1997, 844 pp.
2. Thomann, R.V., and J.A. Mueller, Principles of Surface Water Quality Modeling and Control, Harper & Row, NY, 1987, 644 pp.

Suggested Reference Book(s):

1. Schnoor, J.L., Environmental Modeling: Fate and Transport of Pollutants in Water, Air,and Soil, John Wiley & Sons, NY, 1996, 682 pp.
2. Gilbert M. Masters and Wendell P. Ela (2017) Introduction to Environment Engineering and Science. 3rd ed. Pearson

Other useful resource(s):

1. Metcalf and Eddy (2003) Wastewater Engineering: Treatment and Reuse, 4th ed., New Delhi, Tata McGraw-Hill.
2. Nathanson J.A. (2009) Basic Environmental Technology: Water Supply, Waste Management and Pollution Control, 4th ed., New Delhi, PHI Learning.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignments (10) - 10 Presentation(1) -10 Attendance/Quiz -5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Surface Water Quality Management)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	**2**
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	**2**
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	**1.75**
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	**2.0**
CO-5	2	2	3	3	3	2	2	1	3	2	2	2	**2.25**
Average	**2**	**2.4**	**2.6**	**2.6**	**2.6**	**1.4**	**1.6**	**1**	**2.2**	**2.2**	**1.6**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Transportation Engineering

COURSE CODE:18B1WCE634

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Highway Engineering

Course Objectives:

1. To learn the fundamentals of railways, airways, water ways & other minor modes of transportation modes. .
2. To provide the students with an in-depth knowledge and understanding of the principles governing the geometric design of railways.
3. To develop an understanding of the concepts related to airport planning & design.
4. To provide fundamental concepts of harbor engineering and other modes of transportation.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To know about the basics and scope of various components of railway and airport engineering.	Familiarity
CO-2	To be able to design the basic elements of railway and airport.	Assessment and Usage
CO-3	To enable the students to apply existing technology to the design, construction, and maintenance of railway physical facilities.	Assessment
CO-4	To learn about the aircraft characteristics, planning and components of tunnel and airport.	Familiarity and Usage
CO-5	To study about the types and components of docks and harbours.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Railway System:** History of railways in India, different project reports, different types of ballast and sleepers, advantages and disadvantages of different types of sleepers, seasoning of sleepers, different types of defects in sleepers, types of rails and their specification, density of sleepers, different types of failure in rail, maintenance of track..	8
2	**Geometric Design of Railway:** railway points and crossings and junction, track laying, superelevation, conning of wheel, different types of fastenings, different component of rail i.e. fish plate, bolt etc. track drainage, station yards,	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

2	**Air Transportation System:** Development of air transport in India ,airport planning, airport design standards, terminal lay out & classification, Design of airport pavements, drainage, marking &lighting, heliports, air traffic control, air cargo, accidents in the air, maintenance of air ports .	10
3	**Docks and Harbours:** Historical development in India , tides, winds & waves, docks, harbours, break waters, jetties, landing stages & wharves, dry docks, transit sheds, cargo handling, , inland water transport. Maintenance.	8
4	**Other Modes of Transportation:** Pipelines, elevators, belt conveyors, aerial rope ways, & under sea transportation.	6

Suggested Text Book(s):

1. Railway engineering, Subhash.C.Saxena & Satyapal Arora, Dhanpat rai &sons,
2. Railway, Airport and Harbour Engineering, K.P. Subramanian, Scitech Publication
3. Railways, bridges &tunnels, Vazirani. V.N, Chandola.S.P, Khanna publications, New Delhi

Suggested Reference Book(s):

1. Airport planning &design, Khanna .S.K, Neem chand publications, Roorkee,
2. Docks &harbors, Levison Francis, Clarendon press,

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Transportation Engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	1	2	3	2	2	3	**2.42**
CO-2	3	3	3	3	2	2	1	2	3	2	2	2	**2.33**
CO-3	3	3	3	2	2	2	1	2	2	2	2	3	**2.25**
CO-4	3	3	3	2	2	1	1	2	3	3	2	2	**2.25**
CO-5	3	2	3	3	3	1	1	3	3	3	3	2	**2.5**
Average	**3**	**2.8**	**3**	**2.6**	**2.2**	**1.6**	**1**	**2.2**	**2.8**	**2.4**	**2.2**	**2.2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Understanding India: Literary Reflections

COURSE CODE: 18BIWHS636
COURSE CREDITS: 3
CORE/ELECTIVE: Elective
L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand migration.
2. To recognize the impact of displacement on individuals.
3. To explore social, economic, cultural and geographical contexts and its relevance for a holistic living.
4. To look for roots and connections in literature with focus on environment and peace in society.
5. To access the impact of gender on migration.
6. To define identity and what it means in the modern context.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Analyze the reason and impact of migration and displacement	Familiarity
CO-2	Explore and understand the socio-cultural and geographical contexts for a holistic living	Assessment
CO-3	Demonstrate familiarity with gender issues	Assessment
CO-4	Understanding the links and connections in construction of identity.	Usage
CO-5	Apprise the students with socio-cultural concepts and historical events like Dalit literature, Bhakti Radicals and Partition literature respectively	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Modern Literature** Cross-cultural Reflections in Vinay Rai's "A Rainbow of Contradictions" from *Think India*	3
2	**From other Margins (Regional environment/ecology, traditions, folklores)** Mamang Dai's "Sorrow of Women" and "An Obscure Place" Sanjoy Hazarika's "There are No Shangri-Las Left"	8
3	**Indian Culture, tradition and societal norms** Rajiv Malhotra's "Indian Comfort with Chaos" and "Western Joker and Indian Clown" from *Being Different: An Indian Challenge to Western Universalism*	8
4	**Views on Education, Indian ethos, identity and rural development**	4

Approved in Academic Council held on 29.11.2021

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	S. Radhakrishnan's "The Adaptive Culture" and "Of One Mind" from *The Adaptive Indian: Identity and Ethos*	
5	**Partition Literature: Migration and identity** Jhumpa Lahiri's "The Triangle", "The Second Exile" and "The Wall" from *In Other Words* Ismat Chugtai's *Roots* rature: Migration and Identity	**8**
6	**Bhakti Radicals and Dalit Literature: Human Rights in India against caste system** The Bhakti Radicals and Untouchability by Gail Omvedt from *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India* Introduction to Dalit Movement; *Karukku* by Bama	**3**
Total lectures		**42**

Suggested Text Book(s):

1. Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism.* Harper Collins: Noida, 2013
2. Radhakrishnan, S. *The Adaptive Indian: Identity and Ethos.* Orient Paperbacks: New Delhi, 2013
3. Lahiri, Jhumpa. *In Other Words.* Penguin: New Delhi, 2017
4. Bhagavan, Manu and Anne Feldhaus.Eds. *Speaking Truth to Power: Religion, Caste and the Subaltern Question in India.* OUP: New Delhi, 2008.
5. Asaduddin, M. *Ismat Chugtai: Lifting the Viel.* Modern Classics. Penguin: New Delhi, 2009

Other useful resource(s):

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment - 6 Group Discussions- 6 Presentations – 8 Class Assessment-5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Understanding India: Literary Reflections)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	2	1	3	3	2	2	2	3	2.0
CO-2	1	3	3	3	3	1	1	3	2	2	1	3	2.1
CO-3	1	2	2	2	3	2	2	3	2	2	1	3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 29.11.2021

CO-4	1	3	3	3	2	3	3	3	2	3	2	3	2.5
CO-5	1	3	3	3	2	3	3	3	2	3	1	3	2.5
Average	1	2.6	2.6	2.6	2.4	2	2.4	3	2	2.4	1.4	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 29.11.2021

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title Vaccine Production ***(Elective Course)***

Course Code

L	T	P
3	0	0

Course Credit 3

Course Coordinator Dr. Harish Changotra

Pre-requisite Basic Biology/Basic Immunology

Course Objectives

The objective of the course is to give a thorough knowledge on the human vaccines and to provide substantial information on various aspects of vaccine production right from their development to delivery.

Course Assessment

Assessment	Max. marks	Duration	Course to be Covered
T1 Test	15	1 hr.	Unit 1-3
T2 Test	25	1.5 hrs.	Unit 1-6
End Term Test (T3)	35	2 hrs.	Complete Syllabus
Teacher Assessment (Based on Assignments, quizzes, presentations etc.)	25	Throughout Semester	Inform class time to time
Total	**100**		

Course Outcomes

CO I	To understand the concepts and immunological basis of vaccines and vaccination.
CO II	To identify various vaccine targets and understand various expression systems for vaccine production.
CO III	To understand vaccine production process of common viral and bacterial vaccines.
CO IV	To understand various vaccine delivery systems and their relative utility.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	**History and introduction to vaccines**	Historical perspectives of vaccines, Edward Jenner's Role in the Introduction of Smallpox Vaccine, Pasteur and the Birth of Vaccines Made in the Laboratory, Overview how the vaccine enters market.	3
2	**Vaccine immunology/basics**	Immune response to vaccines, stimulating immune response for an effective vaccine (immunomodulation), types of vaccines, active and passive immunization, role of adjuvants in vaccines, primary and secondary immune response, immunological memory.	6
3	**Evaluation of vaccine efficiency**	Vaccines target identification, Methods for evaluation of clinical immune response to vaccines, vaccine safety.	3
4	**Expression systems for vaccine production**	E. Coli, Fungal and novel; **vaccine purification:** viral and protein subunit; **conjugate vaccine production technology; stabilization and formulation of vaccines; lyophilization in vaccine processes.**	6
5	**Viral vaccines and their production**	Vaccines for important common viral diseases and their production; MMR Hepatitis viruses (Hepatitis A, Hepatitis B, Hepatitis C Virus: current status), Polio, Japanese encephalitis, HIV (current status), Yellow fever, Influenza, Rabies (biology of these viruses, various approaches to develop vaccines for these, vaccine production and quality control, and their current status).	7
6	**Different bacterial vaccine and their production**	DPT group of vaccines, their production quality control and future prospects. (Diphtheria, Pertussis and Tetanus). BCG vaccine for tuberculosis, production and quality control. New generation tuberculosis vaccine. Vaccines against typhoid, Vaccines against enteric bacterial infection like *Escherichia coli* and *Shigella dysenteriae.*	6
7	**New generation technology for vaccine production**	Reverse Vaccinology: A Novel Genomic Approach to Antigen Identification, The Serogroup B Meningococcus Vaccine. Pan-Genome Reverse Vaccinology. Applications of Functional Genomics and High-Throughput Sequencing in Vaccine Design. Edible vaccines and their production. DNA vaccines for infectious bacteria and their limitations. Recombinant DNA vaccines. **Challenges to Malaria/ Kalazar vaccine.**	8
8	**Vaccine delivery**	Liposomal, virosomes, emulsion, polymeric nanoparticle, micellar and dentrimer delivery systems, immunostimulatory complexes, edible	3

IQAC
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

		vaccines.	
	Total Number of Lectures		**42**

Methodology

Interactive lectures, discussions, case studies, problem solving etc. to promote critical thinking and engage students in an active learning process.

REFERENCE BOOKS

1	Wen PE, ELLIS P and PUJAR NS (2015) Vaccine development and manufacturing. John Wiley & Sons, Inc., Hoboken, New Jersey.
2	WHO TRS (World Health Organization: Technical Report Series on Vaccines)
3	Paoletti LC and McInnes PM (1999) Vaccines: From Concept to Clinic: A Guide to the Development and Clinical Testing of Vaccines for Human Use. CRC Press, N.Y.
4	Morrow WJW, Sheikh NA, Schmidt CS, Davies DH (2012) Blackwell Publishing Ltd.
5	Levine MM (2010) New Generation Vaccines, 4th Ed., Informa Healthcare, N.Y.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title Virology **(Elective Course)**

Course Code

L	T	P
3	0	0

Course Credit 3

Course Coordinator Dr. Harish Changotra

Pre-requisite Basic Biology

Course Objectives

Objective of this course is to enable the students to have the understanding on the basics of the Virology. This would impart the knowledge regarding the basic concepts in virology, life cycles of various viruses, oncogenic viruses and various antiviral strategies to control infection. The Course would be extremely beneficial to graduates if they want to further pursue a career in virology.

Course Assessment

Assessment	Max. marks	Duration	Course to be Covered
T1 Test	15	1 hr.	Unit 1-3
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Complete Syllabus
Teacher Assessment (Based on Assignments, quizzes, presentations etc.)	25	Throughout Semester	Inform class time to time
Total	**100**		

Course Outcomes

CO I	To understand basic concepts of virology and need to study viruses.
CO II	To understand the structure of the virus, classification and who they enter into the cell.
CO III	To understand various viral replication mechanisms and how the viruses exit the cell.
CO IV	To understand outcomes of the infection including mechanisms of virus induced oncogenesis.
CO V	To understand the process of antiviral drug development and mechanisms of drug resistance.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Viruses and their importance	History and discovery, characteristics of viruses, need to study viruses.	3
2	Virus structure and classification	Virus structure introduction, viral genomes and proteins, history of virus classification and nomenclature, modern virus classification and nomenclature, Baltimore classification of viruses.	4
3	Virus entry and uncoating	Virus binding to the cell surface, mobility of cell-associated viruses, signals induced by virus, endocytic pathways of infection, penetration by non-enveloped viruses, intracellular trafficking, triggering the uncoating program, nuclear import.	4
4	Viral replication strategies	Unique biology of virus replication, subcellular sites of viral replication, error prone nature of rna replication, host cell components for replication, host cell components for replication, DNA replication, double-stranded RNA replication, single-stranded RNA replication, reverse transcription.	8
5	Assembly and exit of virus from the cell	Nucleocapsid assembly, Formation of virion membranes, Virion exit from the infected cell	4
6	Outcomes of viral infection	Factors affecting outcomes of infection, non-productive infections, productive infections.	3
7	Viruses, cell transformation and cancer	Viral transformation principles, transformation by retroviruses, mechanisms of DNA virus oncogene action, why do viruses transform cells? Viruses and Human Cancer.	8
8	Antiviral agents	Importance of antiviral drugs and barriers to their development, the process of antiviral drug development, importance of antiviral drugs for basic science, general aspects of antiviral drug, mechanisms of drug resistance.	8
		Total Number of Lectures	**42**

IQAC
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Methodology

Interactive lectures, discussions, case studies, problem solving etc. to promote critical thinking and engage students in an active learning process.

REFERENCE BOOKS

1	Knipe DM and Howley PM (2013) Fields virology. Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia. 6th Ed
2	Carter J and Saunders V (2013) Virology: Principles and Applications. Wiley: Hoboken, New Jersey. 2nd Ed.
3	Cann A (2011) Principles of Molecular Virology. Elsevier Academic Press, US. 5th Ed.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Advanced Algorithms

COURSE CODE: 18B1WCI743

COURSE CREDIT: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Analysis of Data Structures and Algorithms (this pre-requisite will not be waived). You are also expected to have the mathematical maturity to write formal proofs and algorithms.

Course Objectives:

1. Learn to analyze algorithms for Time and Space Complexity
2. Learn asymptotic notations for performance analysis of algorithms.
3. Learn various computing algorithms and data structure used in solving complex problems.
4. Apply important algorithmic design paradigms and method of analysis.
5. Synthesize efficient algorithm design in common engineering design situations.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Analyze the asymptotic performance of algorithms.	Familiarity
CO-2	Write rigorous correction proof s of algorithms.	Assessment
CO-3	Demonstrate a familiarity with major algorithms and data structure.	Assessment
CO-4	Apply important algorithmic design paradigms and method of analysis.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Review of Analysis Techniques:** Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate,Accounting and Potential Methods.	8
2	**Graph Algorithms:** Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.	8
3	**Polynomials and the FFT:** Representation of polynomials;The DFT and FFT; Efficient implementation of FFT.	6
4	**Number -Theoretic Algorithms:** Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization	6
5	**String-Matching Algorithms:** Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms.	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

6	**Probabilistic and Randomized Algorithms:** Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms; Probabilistic numeric algorithms.	6
Total lectures		**42**

Suggested Text Book(s):

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.
3. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007

Suggested Reference Book(s):

1. S. Muthukrishnan, "Data streams: Algorithms and applications", Foundations and Trends in Theoretical Computer Science, Volume 1, issue 2, 2005.
2. Bach, E., and J. Shallit. Algorithmic Number Theory. Vol. 1. Cambridge, MA: MIT Press, August 26, 1996. ISBN: 9780262024051.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106104019/
2. Link to topics related to course:
   a. https://nptel.ac.in/courses/106104019/1
   b. https://nptel.ac.in/courses/106104019/4
   c. https://nptel.ac.in/courses/106104019/26
   d. https://nptel.ac.in/courses/106104019/27

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Advanced Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Java Programming

COURSE CODE: 18B1WCI534

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Object-Oriented Systems and Programming

Course Objectives:

1. Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
2. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
3. Design and develop Web applications
4. Designing distributed applications using Remote Method Invocation (RMI)

Course Outcomes:

S. No	Course Outcomes	Level of Attainment
CO-1	To learn the graphics and animation on the web pages, using Java Applets. To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings	Usage
CO-2	To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.	Usage
CO-3	To learn the server side programming using Servlets and JSP.	Usage
CO-4	To learn the invocation of the remote methods in an application using RMI	Usage

Course Contents:

Unit	Contents	Lectures required
1	Applet Programming: Structure and Life Cycle of a Java Applet, Graphics, Multithreading and Animation, Abstract Windowing Toolkit, Swings and Event Handling.	8
2	Java Database Connectivity (JDBC): JDBC Product, Types of Drivers, Two- Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface.	6
3	Java Servlets: Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP. Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page, JSP with Java Bean.	10
4	Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application.	4
	Total Lectures	28

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2. Advanced Java Programming by Uttam K. Roy, Publisher: Oxford University Press

Suggested Reference Book(s):

1. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media

Other useful resource(s):

1 Link to NPTEL course contents:

i. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

ii. https://nptel.ac.in/courses/106105084/28

2 Link to topics related to course:

i. https://www.javatpoint.com/

ii. https://www.tutorialspoint.com/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Java Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	1	2	2	3	1	3	1	3	2.2
CO-2	3	3	2	2	1	2	1	3	2	2	3	3	2.3
CO-3	3	3	2	3	3	3	1	3	2	3	3	2	2.6
CO-4	3	3	2	3	3	3	1	3	2	3	3	2	2.6
Average	3	3	2	2.5	2	2.5	1.3	3	1.8	2.8	2.5	2.5	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Object Oriented Technologies using Java

COURSE CODE: 19B1WCI734

COURSE CREDITS: 2

ELECTIVE: OPEN ELECTIVE

: 2-0-0

Pre-requisite: Introduction to C Programming

Course Objectives:

Today almost every branch of computer science is feeling presence of object- orientation. Object oriented technology is successfully incorporated in various fields of computer science. Since its arrival on the scene in 1995, the Java has been accepted as one of the primary programming language. This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	Understanding the features and concepts of Object-Oriented Programming using Java	Familiarity
CO2	Defining classes, objects, constructors, methods in Java	Usage
CO3	Inheritance, Interfaces, and Polymorphism	Usage
CO4	Packages, Exception Handling, and Multithreading	Usage

Course Contents:

S No	Topics	Lectures required
1	Object-Oriented Concepts: Classes and Objects, Abstraction and Encapsulation, Inheritance, and Polymorphism.	2
2	Java Language Basics Introduction To Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type And Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators.	3
3	Expressions, Statements and Arrays Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump Statements, Arrays.	2
4	Class and Objects Class Fundamentals, Creating objects, Assigning object reference variables, Introducing Methods, Static methods,	5
	Constructors, Overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects, Method Overloading, Garbage Collection, The finalize () Method.	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Strings and Characters Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using valueOf() Methods, String Buffer Class and Methods.	2
6	Inheritance and Polymorphism Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword.	4
7	Packages and Interfaces Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes, Extends and Implements Together.	3
8	Exceptions Handling Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses	3
9	Multithreaded Programming Multithreading: An Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter-thread Communication.	4
	Total	**28**

Suggested Text Book(s):

1. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
2. Bruce Eckel, Thinking in Java

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	35	2 hours	Syllabus covered upto Test-3
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	2	2	1	2	2	1	1	1	3	3	**1.75**
CO-2	1	1	3	1	3	3	3	1	2	1	1	3	**1.92**
CO-3	2	2	1	2	1	1	2	3	1	3	2	1	**1.75**
CO-4	1	3	3	3	3	3	1	1	2	1	2	1	**2**
Average	**1.5**	**1.75**	**2.25**	**2**	**2**	**2.25**	**2**	**1.5**	**1.5**	**1.5**	**2**	**2**	

Approved in Academic Council held on 25.10.2018

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Cloud Computing

COURSE CODE: 18B1WCI737

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Operating System

Course Objectives:

1. To demonstrate an understanding of cloud computing concepts and standards.
2. To understand all enabling technologies of Cloud computing.
3. To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
4. To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To understand different enabling technologies for Cloud computing environment.	Assessment
CO-3	To design Cloud computing data-center for effective utilization of available resources	Usage
CO-4	To study different managers related to Cloud computing services	Assessment
CO-5	To understand dofferent case studies of Cloud computing and its advance topics	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Understanding Cloud Computing:** Basic Concepts and terminology, Goals and Benefits. Risks and Challenges, Roles and boundaries, Cloud characteristics, Cluster Computing, Grid Computing, NIST Architecture, Cloud Deployment models, Cloud service models.	7
2	**Cloud Enabling Technologies:** Virtualization, Types of virtualization, Server Consolidation, virtualization management, Web Technology, Service, Oriented Architecture, Datacenter and Multi-tenancy	7
3	**Cloud Infrastructure Management:** Cloud datacenter design, Workloads and software infrastructure for a datacenter, Datacenter hardware, energy and power efficiency in a datacenter., Cloud usage monitor, Monitoring agent, Resource agent, Polling Agent	7
4	**Cloud Mechanisms:** Automated Scaling, Load Balancer, SLA Monitor, Failover System, Multi-Cloud Broker	7

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Fundamental Cloud Architectures:** workload distribution architecture, resource pooling architecture, dynamic scalability architecture, service load balancing architecture, cloud brusting architecture. Billing Management System Business cost metrics, cloud usage cost metrics,	7
6	Cloud service metrics., Cloud Security, Mobile cloud computing, Disaster recovery in cloud computing, Case studies	7
Total lectures		**42**

Suggested Text Book(s):

1. Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568
2. Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.

Suggested Reference Book(s):

1. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
2. The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
3. Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
4. The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
2. Link to topics related to course:
   i. https://www.edx.org/learn/cloud-computing
   ii. https://www.udemy.com/introduction-to-cloud-computing/

Evaluation Scheme:

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Cloud Computing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	1	1	2	2	1	2	2	1	2	3	**1.8**
CO-2	3	2	1	2	2	2	1	2	2	1	3	2	**1.9**
CO-3	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-4	2	2	3	2	2	1	3	2	1	1	1	1	**1.8**
CO-5	3	3	3	3	3	1	2	1	2	2	3	2	**2.3**
Average	**2.6**	**2**	**2.2**	**2**	**2.2**	**1.4**	**2**	**1.8**	**1.6**	**1.2**	**2**	**1.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computer Organization and Architecture

COURSE CODE: 18B11CI514
COURSE CREDIT: 3
CORE/ELECTIVE: CORE
L-T-P: 3-0-0

Pre-requisites: Basic Understanding of Computer System

Course Objectives:

1. To calculate the performance of a modern digital computer from parameters such as processor speed, cycles per instruction.
2. To understand the fixed-point and floating-point numbers are represented in a computer.
3. Discuss about pipelining in a processor functions and describe how hazards are resolved in various ways.
4. Wide understanding of memory organization and management in a modern digital computer, including virtual and physical memory, address translation, multilevel, unified, and multi-way set-associative caches, the translation-look-aside buffer (TLB), and the page table.
5. To understand the working strategies of parallel processing and multi-core computers.

Course Outcomes:

S. No	Course Outcome (Computer Organization & Architechture)	Level of Attainment
CO-1	To learn the basic concepts, terminology and evolution in computer organization and architecture	Familiarity
CO-2	Understanding the computer architecture and computer arithmetic.	Assessment
CO-3	Understanding of the computer memory and the issues related to memory.	Assessment
CO-4	Understanding the concept of memory I/O, interrupt handling and DMA.	Assessment
CO-5	Learn the organization of Processor and the concept of pipelining.	Assessment
CO-6	Learning concepts of Parallel processing and related issues.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Basic Structure of Computers: Functional units:** Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC.	7
2	**Basic Processing Unit of Computers:** ALU design – Integer Representation, floating point and its Arithmetic. Interconnection Structure, Bus interconnection Structure, point to point interconnection PCI express structure.	7
3	**Computer Memory:** Cache Memory: Overview of computer Memory, Cache memory principles and its elements to design P-4 Cache organization.	6
4	**Internal and External Memory:** Semiconductor Memory: Semiconductor Main Memory, Error correction. External Memory: Magnetic Disk and Tape, RAID, SSD, Optical Memory.	
5	**Input/output:** Access of I/O devices, I/O ports, I/O control mechanisms - Program controlled I/O Interrupt controlled I/O and DMA controlled I/O I/O interfaces Program controlled I/O, Interrupt controlled I/O, and DMA controlled I/O, I/O interfaces - Serial port,	6

Approved in Academic Council held on 25.10.2018

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

	Parallel port, PCI bus, SCSI bus, USB bus	
6	**Central Processing Unit:** Processor Structure and Functions: Processor structure, register organization, instruction cycle and pipelining.	4
7	**Instruction level Parallelism:** Overviews, design issues, vector processing	3
8	**Parallel Processing:** Multiple Processor Organization, Symmetric Multi-processors, cache coherence, multithreading, clusters, non- uniform memory access, and vector computation.	5
Total lectures		**42**

Suggested Text Book(s):

1. William Stallings, Computer Organization & Architecture - Designing for Performance Eighth Edition, Pearson, 2010. ISBN 978-81-317-3245-8.
2. M. Morris Mano, Computer System Architecture, Pearson.

Suggested Reference Book(s):

1. John L. Hennessy and David A. Patterson ,Computer Architecture: A Quantitative Approach, Fourth Edition, Morgan Kaufmann Publishers
2. M. Morris Mano , Computer System Architecture, Third Edition, Pearson Education Inc
3. Luiz Andre Barroso and Urs Holzle;The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines Morgan and Claypool Publishers

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/syllabus/106103068/
2. Link to topics related to course: https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs):

Course Outcomes (Computer Organization and Architecture)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	2	1	2	1	1	2	1.8
CO-2	3	3	3	3	1	3	1	2	2	2	2	2	2.3
CO-3	3	2	3	3	2	2	2	2	2	2	2	2	2.3
CO-4	3	3	3	2	2	3	2	2	3	2	2	2	2.4
CO-5	3	2	2	3	2	3	3	2	3	2	2	2	2.4
CO-6	3	2	2	2	3	2	2	2	3	1	2	2	2.2
Average	**3**	**2.3**	**2.5**	**2.5**	**2**	**2.5**	**2**	**1.8**	**2.5**	**1.7**	**1.8**	**2**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Formal Languages and Automata

COURSE CODE: 18B11CI513

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisites: Graduate level courses in C programming, algorithms and complexity of algorithms are desirable.

Course Objectives:

1. To introduce the students to the mathematical foundations of computation including automata theory
2. To introduce the students about the theory of formal languages and grammars
3. To introduce the students about the theory of Automata which includes Finite Automata, Push down Automata and Turing Machines
4. To introduce the students about the notions of algorithm, decidability
5. To introduce the students about the Complexity and computability

Course Outcome (CO):

S.No.	Course Outcomes	Level of Attainment
CO-1	Broaden knowledge of the fundamental mathematical and computational principles that are the foundation of computer science	Familiarity
CO-2	Understand the concept of Deterministic Finite Automata and Non-Deterministic Finite Automata	Usage
CO-3	Understand how to minimize the states, usage Moore and Mealy Machine	Assessment
CO-4	Understand how to use the context free grammars in languages and how to derive parse trees and solve ambiguity problems	Assessment
CO-5	Understand Normal forms for Context Free Grammar"s Chomsky and Greibach Normal Forms	Assessment
CO-6	Understand the Push Down Automaton algorithm	Assessment
CO-7	Understand how the push down automata will accept arbitrary context free languages. To understand the properties of CFG To understand the determinism and parsing. To understand different parsing methodologies	Assessment
CO-8	Understand the basic concepts of Turing Machine, configuration of Turing Machine, computing with the Turing Machine	Usage
CO-9	Understand multiple tapes, two way infinite tape concepts, the real computers random access memories working, concept of non-deterministic Turing machines	Assessment
CO-10	Understand the computational power of languages, numerical functions applied to Turing machines, numerical functions applied to Turing machines, various mathematical models applied to Turing machines, the concept of halting problem, undecidable problems about Turing machines and grammars, properties of recursive languages, concept of polynomial decidable	Assessment

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	Introduction &Motivation, Infinite Sets, Closures, Alphabets, Languages & Representation	3
2	Deterministic finite automata, Non-Deterministic finite automata, Closure Properties & Equivalences, State Minimization, Moore and Mealy Machine	6
3	Formal Languages, Regularity, Regular Grammars, Regular Expressions and Finite Automata	6
4	Context Free Grammars, Parse Trees & Ambiguity, Chomsky and Greibach Normal forms	8
5	Push Down Automata, Equivalence of PDA and CFG, Properties of context free languages, Determinism & Parsing DCFG, Top-down & Bottom-up Parsing	6
6	Turing Machine-Introduction, Notations, Recursive and Recursively Enumerable Language, Extensions of Turing machines, Non-deterministic Turing machines, Primitive Recursive Functions, Mu-recursive functions	8
7	Church-Turing Thesis & Universal Turing machines, Halting problem, Undecidable problems, Properties of Recursive languages	2
8	The Complexity Class P, Satisfiability, The Complexity Class NP, NP Completeness and Reducibility NP complete problems, Cook's Theorem, NP Complete Problems	3
Total lectures		**42**

Suggested Text Book(s):

1. Elements of the Theory of Computation. Harry Lewis, Christos Papadimitriou, Second Edition, Pearson Education, 1998

2. Theory of computer Science: Automata, Language and Computation - KLP Mishra N Chandra Sekhran - PHI, 3rd edn.

Suggested Reference Book(s):

1. Formal Languages and Automata- Peter Linz , Narosa Pub. 4th edn.

2. M. Sipser, Introduction to the Theory of Computation, Thomson Asia, 1997.

3. J. E. Hopcroft, R. Motwani and J. D. Ullman, Introduction to Automata Theory, Languages and Computation, Pearson, 2001.

4. D. C. Kozen, Automata and Computability, Springer-Verlag, 1997.

Other useful resource(s):

1. https://nptel.ac.in/courses/111103016/
2. Link to topics related to course:
   - i. https://ocw.mit.edu/courses/mathematics/18-404j-theory-of-computation-fall-2006/
   - ii. http://www.aduni.org/courses/theory/
   - iii. http://www.cse.iitd.ernet.in/~sak/courses/toc/
   - iv. http://cse.iitkgp.ac.in/~abhij/course/theory/FLAT/Spring13/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Formal Languages and Automata)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	3	3	2	1	3	2	1	2.2
CO-2	3	3	3	2	2	3	3	3	1	3	3	1	2.5
CO-3	3	3	3	2	2	3	2	3	2	2	3	2	2.5
CO-4	3	3	3	2	2	2	3	2	2	3	2	2	2.4
CO-5	3	3	3	2	2	2	2	2	1	2	2	1	2.1
CO-6	3	3	3	3	2	3	3	2	2	3	2	2	2.6
CO-7	3	3	3	3	2	3	3	2	2	3	2	2	2.6
CO-8	3	3	3	2	2	3	3	3	2	3	3	2	2.7
CO-9	3	3	3	2	2	3	3	3	2	3	3	2	2.7
CO-10	3	3	3	2	2	3	3	3	2	3	3	2	2.7
Average	3	2.9	2.9	2.2	2	2.8	2.8	2.5	1.7	2.8	2.5	1.7	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Information Systems

COURSE CODE: 18B11CI512

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P-: 3-0-0

Pre-requisite: Java Programming

Course Objectives:

1. Understand various technologies and processes available for developing business software.
2. Study and understand underlying infrastructure of information systems.
3. Learn to identify and analyze requirements for information systems
4. Develop proficiency in structuring, collecting, and analyzing data to support business operations and strategic decision making.
5. Understand and apply design principles in Information Systems
6. Demonstrate proficiency in selecting, implementing and operating information technology solutions to meet organizational requirements.
7. Develop an understanding of the social issues and ethical implications of technology across organizations and society.
8. Develop a proficiency in the selection of tools, techniques, processes, and success factors related to effective management of IT projects.
9. Develop proficiency in business reporting and strategic analysis of data..

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the fundamental terms and concepts of information systems, associated technologies and underlying infrastructure.	Familiarity
CO-2	To understand how IT provides value by improving the management process through access to better information.	Familiarity
CO-3	To acquire knowledge and develop hands on skills on various information system development technologies.	Usage and Assessment
CO-4	To understand and analyze information system categories along with their principles and design issues.	Familiarity and Assessment
CO-5	To understand and analyze the social issues and ethical implications of technology across organizations and society.	Familiarity and Assessment
CO-6	To develop the ability to evaluate information systems, assess user needs, propose solutions, and evaluate proposals for implementation.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Information Systems, Concept and characteristics of information, Essential aspects of information systems in a company, Information technology,	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	Architectural components of information systems, MVC approach to building Information Systems	2
3	Information system development technologies, Java Servlets, Java Server pages, Session Management, Enterprise Java Beans, Enterprise Computing, Java cryptography Architecture.	8
4	Information System categories • Transaction Processing Systems (TPS) • Management Information System (MIS) • Decision Support Systems (DSS): Problem resolution with DSS, Possibilities of DSS, Use of spreadsheets as decision-making support systems, Using DSS in decision making process, • Executive Information Systems (EIS): Evolution, EIS concepts and categories	12
5	Information System categories Specification: • design issues and principles • User interface design; demonstrating good UI design principles; • Contemporary Information Systems Architectures; • Contemporary information system development tools, components and techniques; • Specific documents and other analysis and design artifacts	4
6	Prototype demonstration Contemporary Issues In Information Systems: Internet mediated communication, Three dimensional communities, Collaboration and digital natives,	4
7	Crowd Sourcing, E-Governance, E-Commerce and location based services, Gender and cyber behaviour, Ethics of building Information Systems	4
8	Introduction to Information Security: What is security approaches to information security implementation, The Security Systems Development Life Cycle, Different types of threats and attacks.	4
Total Lectures		42

Suggested Text Book(s):

1. Rafael L. Alcami, Carlos D. Caranana, "Introduction to Management Information Systems".
2. Marty Hall, Larry Brown, "Core Servlets and Java Server Pages", Prentice Hall
3. Whitman, M.E. and Mattord, H.J., 2011. Principles of information security. Cengage Learning.

Suggested Reference Book(s):

1. Ethan Cerami, "Web Services Essentials", O'Reilly
2. Kogent, "Java Server Programming tutorial, J2EE Black Book", Dreamtech Press
3. Herbert Schildt, "The Complete Reference: JAVA", Tata McGraw-Hill
4. Kathy Sierra & Bert Bates, "Head First EJB", O'Reilly
5. Phil Hanna, "The Complete Reference: JSP 2.0" Tata McGraw-Hill

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6. Stefan B. Harsh, "Management Information Systems"

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/122105022/
2. Link to topics related to course:
3. https://www.coursera.org/learn/information-security-data
4. https://www.journaldev.com/2114/servlet-jsp-tutorial
5. https://www.javatpoint.com/servlet-tutorial
6. http://www.springer.com/business+%26+management/business+information+systems/journal/10796
7. http://www.irma-international.org/journal/international-journal-enterprise-information-systems/1086/
8. https://www.journaldev.com/1854/java-web-application-tutorial-for-beginners
9. https://www.udemy.com/javawebtut/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 9 Quizzes(2) -12 Attendance - 4

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Information Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-2	3	3	2	1	1	3	3	1	3	3	3	1	2.3
CO-3	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-4	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-5	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-6	3	2	2	1	2	2	2	2	1	2	1	2	1.8
Average	3	2.7	2.2	1.2	1.7	2.5	2.7	1.8	2	2.5	2	1.5	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

Information Systems

COURSE CODE: 18B11CI512

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P-: 3-0-0

Pre-requisite: Java Programming

Course Objectives:

1. Understand various technologies and processes available for developing business software.
2. Study and understand underlying infrastructure of information systems.
3. Learn to identify and analyze requirements for information systems
4. Develop proficiency in structuring, collecting, and analyzing data to support business operations and strategic decision making.
5. Understand and apply design principles in Information Systems
6. Demonstrate proficiency in selecting, implementing and operating information technology solutions to meet organizational requirements.
7. Develop an understanding of the social issues and ethical implications of technology across organizations and society.
8. Develop a proficiency in the selection of tools, techniques, processes, and success factors related to effective management of IT projects.
9. Develop proficiency in business reporting and strategic analysis of data..

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To understand the fundamental terms and concepts of information systems, associated technologies and underlying infrastructure.	Familiarity
CO-2	To understand how IT provides value by improving the management process through access to better information.	Familiarity
CO-3	To acquire knowledge and develop hands on skills on various information system development technologies.	Usage and Assessment
CO-4	To understand and analyze information system categories along with their principles and design issues.	Familiarity and Assessment
CO-5	To understand and analyze the social issues and ethical implications of technology across organizations and society.	Familiarity and Assessment
CO-6	To develop the ability to evaluate information systems, assess user needs, propose solutions, and evaluate proposals for implementation.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Information Systems, Concept and characteristics of information, Essential aspects of information systems in a company, Information technology.	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

2	Architectural components of information systems, MVC approach to building Information Systems	2
3	Information system development technologies, Java Servlets, Java Server pages, Session Management, Enterprise Java Beans, Enterprise Computing, Java cryptography Architecture.	8
4	Information System categories • Transaction Processing Systems (TPS) • Management Information System (MIS) • Decision Support Systems (DSS): Problem resolution with DSS, Possibilities of DSS, Use of spreadsheets as decision-making support systems, Using DSS in decision making process, • Executive Information Systems (EIS): Evolution, EIS concepts and categories	12
5	Information System categories Specification: • design issues and principles • User interface design; demonstrating good UI design principles; • Contemporary Information Systems Architectures; • Contemporary information system development tools, components and techniques; • Specific documents and other analysis and design artifacts	4
6	Prototype demonstration Contemporary Issues In Information Systems: Internet mediated communication, Three dimensional communities, Collaboration and digital natives,	4
7	Crowd Sourcing, E-Governance, E-Commerce and location based services, Gender and cyber behaviour, Ethics of building Information Systems	4
8	Introduction to Information Security: What is security approaches to information security implementation, The Security Systems Development Life Cycle, Different types of threats and attacks.	4
Total Lectures		42

Suggested Text Book(s):

1. Rafael L. Alcami, Carlos D. Caranana, "Introduction to Management Information Systems".
2. Marty Hall, Larry Brown, "Core Servlets and Java Server Pages", Prentice Hall
3. Whitman, M.E. and Mattord, H.J., 2011. Principles of information security. Cengage Learning.

Suggested Reference Book(s):

1. Ethan Cerami, "Web Services Essentials", O'Reilly
2. Kogent, "Java Server Programming tutorial, J2EE Black Book", Dreamtech Press
3. Herbert Schildt, "The Complete Reference: JAVA", Tata McGraw- Hill
4. Kathy Sierra & Bert Bates, "Head First EJB", O'Reilly
5. Phil Hanna, "The Complete Reference: JSP 2.0" Tata McGraw-Hill

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

6. Stefan B. Harsh, "Management Information Systems"

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/122105022/
2. Link to topics related to course:
3. https://www.coursera.org/learn/information-security-data
4. https://www.journaldev.com/2114/servlet-jsp-tutorial
5. https://www.javatpoint.com/servlet-tutorial
6. http://www.springer.com/business+%26+management/business+information+systems/journal/10796
7. http://www.irma-international.org/journal/international-journal-enterprise-information-systems/1086/
8. https://www.journaldev.com/1854/java-web-application-tutorial-for-beginners
9. https://www.udemy.com/javawebtut/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 9 Quizzes(2) -12 Attendance - 4

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Information Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-2	3	3	2	1	1	3	3	1	3	3	3	1	2.3
CO-3	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-4	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-5	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-6	3	2	2	1	2	2	2	2	1	2	1	2	1.8
Average	3	2.7	2.2	1.2	1.7	2.5	2.7	1.8	2	2.5	2	1.5	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Introduction to Statistical Learning

COURSE CODE:19B1WCI740

COURSE CREDITS: 3

CORE/ELECTIVE: OPEN ELECTIVE

L-T-P: 2-0-1

Pre-requisite: Basics of programming and mathematics.

Course Objectives:

1. To understand the fundamentals of statistical learning and, analyzing regression and classification.
2. To understand and analyze pre-processing data and model selection.
3. To understand and analyze non-linear and tree based regression.
4. To understand and analyze Support Vector Classifier and Machines, and unsupervised learning.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding statistical learning and, analyzing regression and classification.	Familiarity and usage
CO-2	Analyzing resampling, model selection and regularization.	Usage
CO-3	Analyzing non-linear and tree based regression.	Usage
CO-4	Analyzing Support Vector Machines and unsupervised learning	Usage

Unit	Contents	Lectures required
1	**Introduction to statistical learning:**Prediction accuracy, Model interpretability, Supervised and Unsupervised learning, Assessing model accuracy	4
2	**Regression and Classification:** Regression- Linear, MultiLinear and kNN, Classification-Logistic regression, Linear and quadratic discriminant analysis, and kNN	6
3	**Resampling, Model Selection and Regularization:**Cross-validation, the bootstrap, Subset selection, Shrinkage methods, Dimension reduction methods, considerations in high dimension	7
4	**Non-linear Regression:**Polynomial regression, Step functions, Regression splines, Smoothing splines, Local regression, Generalized additive methods, **Tree Based Regression:** the basics of decision trees, Bagging, Random forest and Boosting,	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

5	**Support Vector Machines:** Maximal margin classifier, Support Vector Classifier and Support Vector Machines, **Unsupervised Learning:** The challenges, Principal Component Analysis, Clustering methods	6
Total lectures		**30**

Course Contents:

SuggSuggested Text Book(s):

1. Gareth James, Daneila Witten, Trevor Hastie and Robert Tibshirani, "An Introduction to Statistical Learning with Applications in R", Springer, 8th Printing, 2017.

Suggested Reference Book(s):

1. Hastie, Tibshirani and Friedman, "The elements of statistical learning", 2nd edition, Springer, 2009.
2. Sanjeev Kulkarni and Gilbert Harman, " An elementary introduction to statistical learning theory, Wiley, 2011.
3. Fernandes de Mello, Rodrigo et. al., " Machine Learning – A practical approach on the statistical learning theory", Springer, 2018.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programmed Outcomes(POs)

Course outcomes (Statistical Learning with Applications in R)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	1	1	2	1	3	2	2.33
CO-2	3	3	3	3	3	3	2	1	2	1	3	2	2.42
CO-3	3	3	3	3	3	3	2	1	2	1	3	2	1.42
CO-4	3	3	3	3	3	3	1	1	2	1	3	2	2.33
Average	3	3	3	3	3	3	1.5	1	3	1	3	3	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT

Computer Graphics

COURSE CODE: 18B11CI515

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisites: Elementary Knowledge about the algorithms, programming, matrices and linear algebra is required

Course Objectives:

1. To learn and understand the basics of computer graphics applications and graphics devices
2. To learn and understand the geometric figure drawing algorithm on graphic device
3. To learn and understand the Two-Dimensional transformations
4. To learn and understand the Three-Dimensional transformations
5. To understand the concepts of solid modelling and representation
6. To learn about the Visible-Surface, Illumination and Shading

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO 1	Student will learn about the overview of computer graphic applications and graphics devices (Display Technologies, Raster Refresh (Raster- Scan), CRT, LCD displays, etc.)	Familiarity
CO 2	Student will learn about the scan conversion - lines, circles and Ellipses, filling, clipping and aliasing	Usage
CO 3	Student will learn about the Two-Dimensional transformations and matrix representation of 2D Transformations (Translations, Rotation, Reflection, Scaling and Combined Transformation) and Window-to- Viewport transformations	Familiarity
CO 4	Student will learn about the Three-Dimensional transformations and viewing in 3D	Assessment
CO 5	Student will learn about the solid modelling: representing solids, regularized Boolean Set operations, primitive instancing, sweep representations, spatial-partitioning representations - Octree representation, B-Reps and Constructive Solid Geometry	Assessment
CO 6	Student will learn about the visible surface detection, illumination and shading	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Computer Graphics: Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Colour CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays, Touch screen, Graphics Primitives.	4
2	Scan conversion – lines, circles and Ellipses; Filling polygons and clipping algorithms, Scan Converting Lines, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Scan Converting Ellipses, Filling Polygons, edge data structure, Clipping Lines algorithms– Cyrus-Beck,	14

	Cohen- Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components	
3	Two-Dimensional Transformations: Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window- to-Viewport Transformations	6
4	Three-Dimensional Transformations and Viewing in 3D: Introduction, Three-Dimensional Scaling, Three-Dimensional Shearing, Three- Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.	10
5	Solid Modelling: Representing Solids, Regularized Boolean Set Operations, Primitive Instancing, Sweep Representations, Spatial- Partitioning Representations: Octree representation, B-Reps, Constructive Solid Geometry, Comparison of Representations	3
6	Visible-Surface Determination: Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter"s algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing,	3
	comparison of the methods	
7	Illumination and Shading: Illumination and Shading Models for Polygons, Reflectance properties of surfaces, Ambient, Specular and Diffuse reflections, Atmospheric attenuation, Phong"s model, Gouraud shading, some examples.	2
8	Image Manipulation and Storage: What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement, contrast stretching, Histogram Equalization, smoothing and median Filtering.	Self- Learning
Total Lectures		42

Suggested Text Book(s):

1. Hearn Donald & Baker, M. Pauline (1990). "Computer Graphics – C Version" Prentice Hall of India Pvt. Ltd.

Suggested Reference Book(s):

1. Foley, J.D. & Dam, A. Van (1982), "Fundamentals of Interective Computer Graphics", Addison-Wesley
2. Harrington, S. (1983). "Computer Graphics: A Programming Approach"" Mc-Graw Hill Book Co.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Sr. No.	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	2	1	2	1	2	2	1.8
CO-2	3	3	3	3	3	1	2	1	3	3	3	3	2.6
CO-3	3	3	3	3	3	1	1	1	3	1	3	3	2.3
CO-4	3	3	3	3	3	3	1	1	3	1	3	3	2.5
CO-5	2	2	2	2	2	2	2	1	2	2	2	2	1.9
CO-6	2	2	2	2	2	2	2	1	2	2	2	2	1.9
Average	2.5	2.5	2.5	2.5	2.5	1.7	1.7	1	2.5	1.7	2.5	2.5	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Digital Electronics & Logic Design Lab

COURSE CODE: 18B17EC372

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

: 0-0-2

Pre-requisite: None

Course Objectives:

1. To provide students basic experimental experiences in constructing digital circuits.
2. Design simple digital systems based on digital abstractions.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO1	To acquire knowledge about electronic components and hardware devices required for designing digital electronics circuits.	Familiarity
CO2	Foster ability to identify, analyze and design combinational circuits.	Familiarity
CO3	Foster ability to design various synchronous and asynchronous sequential circuits.	Usage
CO4	To acquire knowledge about internal circuitry and logic behind any digital system.	Usage
CO5	To develop skill to build, and troubleshoot digital circuits.	Assessment

List of Experiments

S. No	Description	Hours
1	To implement Logic gates using TTL ICs (7400, 7402, 7404, 7408, 7410, 7411, 7420, 7427, 7432, and 7486).	2
2	Implementation of Combinational Circuits.	2
3	To verify NAND and NOR gates are universal gates.	2
4	Implementation of Combinational Logic Design using 74** ICs.	2
5	Simplification of Boolean expression using Karnaugh Map Method.	2
6	To design a 4 bit Binary to Gray code Converter, bit Gray to Binary code Converter, 3 bit Binary to Excess-3 code Converter.	2
7	To implement Adder and Subtractor circuits:- (Half and Full using simple gates and universal gates).	2
8	Implement multiplexer using gates and TTL IC's.	2
9	To verify the truth table of Binary (2 bit) to decimal decoder and octal to decimal decoder.	2
10	To verify the truth table of one bit and two bit Comparators using logic Gates.	2
11	To verify the truth tables for each (a) DDL OR gate (b) DDL AND gate (c) TTL OR gate (d) TTL AND gate (e) TTL NAND gate (f) TTL NOR gate.	2
12	Functional table verification of Latches: • SR-Latch with NOR Gates • SR-Latch with NAND Gates • SR-Latch with control input using NAND Gates • D Latch • T Latch	2
Total Lab hours		24

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested/Resources:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India.
2. M. M. Mano, "Digital Logic and Computer Design", Pearson Education India.
3. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education.
4. https://onlinecourses.nptel.ac.in/noc18_ee33/ (Prof. Santanu Chattopadhyay, IIT Kharagpur)
5. https://nptel.ac.in/courses/117106086/ (Prof. S. Srinivasan, IIT Madras)

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Microprocessor and Interfacing

COURSE CODE: 18B11EC512

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: None

Course Objectives:

1. To study the architecture, instruction set and interfacing of the Intel microprocessors.
2. To gain proficiency in assembly language programming.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand Standard Architecture of Intel Microprocessors	Familiarity
CO-2	Learn the instruction set of Intel 80x86 processors and to gain proficiency in assembly language programming	Usage
CO-3	Know the concepts associated with interfacing a microprocessor to memory and to I/O devices and to learn the programming of peripheral I/O devices	Usage
CO-4	Learn the control components of a microprocessor based system though the use of interrupts	Assessment
CO-5	Acquaint with the background knowledge for understanding next-generation CPUs	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Overview of the Intel Family of the Microprocessors. Introduction to 8085 Microprocessor	4
2	The 8086 microprocessor architecture, Addressing Modes; Register Addressing; Immediate Addressing; Direct Data Addressing; Register Indirect Addressing; Base- Plus-Index Addressing; Register Relative Addressing; Base Relative-Plus-Index Addressing	4
3	8086 Instruction Set	4
4	Using assembly language with C/C++; Using Assembly Language with C++ for 16- Bit DOS Applications, Mixed Assembly and C++ Objects	2
5	Programming the 8086 microprocessor; Modular Programming, Using the Keyboard and Video Display, Disk Files	2
6	8086 Hardware specifications; Pin-Outs and the Pin Functions, Clock Generator (8284A), Bus Buffering and Latching, The 8288 Bus Controller	4
7	8086 Memory Interface; Memory Devices, Address Decoding, Memory Interface, Dynamic RAM	4
8	Basic I/O Interface; I/O Port Address Decoding, Programmable Peripheral Interface (8255), Programmable Interval Timer (8254), Programmable Communications Interface (16550), ADC(ADC804) and DAC (DAC830)	6
9	Interrupts; 8259A Interrupt controller	2
10	Direct memory access and DMA-controlled I/O; 8237 DMA controller	2
11	The arithmetic coprocessor; MMX, and SIMD technologies, 8087 arithmetic coprocessor	2
12	Bus interface; ISA Bus, PCI Bus, Parallel Printer Interface, Serial COM Ports, Universal Serial Bus (USB), Accelerated Graphics Port (AGP)	2
13	Intel Pentium and Core2 Processors	4
Total lectures		42

Suggested Text Book(s):

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

1. Berry B.Brey, "The Intel Microprocessors : Architecture, Programming, and Interfacing," 8th Ed., Prentice Hall, 2009.
2. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085," 6th Ed., Penram, 2013.

Suggested Reference Book(s):

1. Douglas V Hall, "Microprocessors & Interfacing," 3rd Ed., McGraw Hill, 2017.
2. Yu-Cheng Liu,Glenn A. Gibson , "The 8086/8088 Family Architecture, Programming & design", 2nd Ed., PHI, 2011.
3. Kenneth Ayala "The 8086 microprocessor programming and Interfacing the PC," 1st Ed., Cengage Learning, 2007.
4. Tom Shanley, "Protected Mode Software Architecture," Addison-Wesley, 1996.

Other useful resource(s):

1. NPTEL ONLINE COURSES: Microprocessors and Microcontrollers
   https://nptel.ac.in/courses/106108100/ (Prof. Krishna Kumar ,IISc Bangalore)
   https://nptel.ac.in/courses/108105102/ (Prof. Santanu Chattopadhyay, IIT Kharagpur)
2. MIT OPEN COURSE WARE: Computer System Architecture
   https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/ (Dr. Joel Emer, Prof. Krste Asanovic, Prof. Arvind)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Microprocessor and Interfacing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	2	x	3	3	3	2	x	x	x	x	x	1	1.17
CO2	3	3	3	2	2	2	x	x	3	3	2	3	2.17
CO3	3	3	3	3	2	2	x	x	3	2	2	3	2.17
CO4	3	3	3	2	2	3	x	x	1	x	x	3	1.67
CO5	3	3	3	2	3	3	x	x	x	x	x	3	1.67
Average	2.80	2.40	3.00	2.40	2.40	2.40	0.00	0.00	1.40	1.00	0.80	2.60	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

XXXXXXXX: Bioinformatics Data Management

Course Credit: 4 (3-1-0)
Semester: III

Introduction

Bioinformatics is a highly interdisciplinary domain and is an excellent source of diversified data. This diversified data needs attention in the collection, analysis and management. Database Management Systems (DBMS) consists of a set of interrelated data and a set of programs to access that data. They underpin any computer system and are therefore fundamental to any programme of study in information science and engineering. An understanding of DBMS is crucial in order to appreciate the limitations of data storage and application behavior and to identify why performance problems arise. With the advent of new technologies in Biological sciences, enormous amount of data is being generated in last two decades. DBMS can support the management of this data through Bioinformatics domain.

Students who complete this course are expected to develop the ability to design, implement and manipulate databases for various biological and medical science domains. Students will apply and build databases for various day to day real life scenarios and real life applications for several diseases and biomedical applications. The course will by and large be structured but will introduce open-ended data base problems for biological data.

Course Objectives (Post-conditions)

Knowledge objectives:

- Understand diversity of biological and biomedical data.
- Ability to build normalized databases.
- Knowledge of Entity Relationship Modeling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues in biological systems.
- Familiarity with ODBC, JDBC.

Application objectives:

- Develop the ability to design, implement and manipulate databases.
- Introduce students to build database management systems.
- Apply DBMS concepts to various biological and biomedical applications.

Expected Student Background (Preconditions)

- Introduction to any programming language (Preferably, C/C++)
- Data Structures

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Topics Outline:

S NO	Topics	Hrs
1	To understand complexity of biological data and Introduction to Database Management Systems	2
2	Introduction to Conceptual Modeling	3
3	Relational Model	2
4	Relational Languages like SQL (including JDBC for database connectivity, ODBC, JDBC and SQLJ)	5
5	Integrity and Security	2
6	Database Design with special relevance to biological data dimensions	5
7	Object oriented and Object Relational Database	4
8	File Storage Methods	2
9	Query Optimization	2
10	Transaction Management	6
11	Database System Architecture	2
12	Development of template databases of biological and biomedical domains	4
13	Case Studies of various Bioinformatics databases	3
	Total	42

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • H.P.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

References

1. Silberschatz, Korth and Sudarshan, "Database System Concepts", 6th Edition,McGraw Hill, 2010
2. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson, Addison-Wesley, 2010
3. C.J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003
4. Ramakrishnan & Gherke, Database Management Systems, 2nd Edn., McGraw
5. Connolly and Begg, "Database Systems", 4th Edn., Addison-Wesley, 2005
6. Toby, Lightstone and Jagadish, "Database Modeling and Design", 5th Edn, Elsevier, 2011
7. Coronel and Rob, "Database Systems", 9th Edn., Cengage, 2011
8. IEEE / ACM Transactions on Database Systems (TODS)
9. DBMS related Journals

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	8 marks (4x2)
Quizzes	12 marks (4x3)
Regularity/Attendance	5 Marks

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Introduction to Machine Learning

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

None

Course

Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods, and classification methods.

urse Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Gain knowledge about basic concepts of Machine Learning	Familiarity
CO-2	Understand complexity of Machine Learning algorithms and their limitations	Familiarity
CO-3	Solve the problems using various machine learning techniques	Usage
CO-4	Design application using machine learning techniques	Assessment
CO-5	Capable of performing experiments in Machine Learning using real-world data.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Overview of intelligent systems and machine learning, Supervised learning, Unsupervised learning, Reinforcement learning, Bias-variance trade-off, Overfitting, Underfitting, Goals and applications of machine learning	5
2	Linear Regression with One Variable: Model representation, Cost function, Gradient descent, Gradient descent for linear regression	4
3	Linear Algebra: Matrices and vectors, Addition and scalar multiplication, Matrix vector multiplication, Matrix multiplication, Matrix multiplication properties, Inverse and transpose, Multivariable calculus, and Modern applications	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4	Linear Regression with Multiple Variables: Multiple features, Gradient descent for multiple variables, Feature scaling, Learning rate, Features and polynomial Regression, Normal equation, Noninvertibility	6

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

5	Logistic Regression: Classification, Hypothesis representation, Decision boundary, Cost function, Simplified cost function and Gradient descent, Advanced optimization, Multiclass classification: One-vs-all	6
6	Bayesian Learning: Probability theory and Bayes rule, Naive Bayes learning algorithm, Parameter smoothing, Generative vs. discriminative training, Bayes nets and Markov nets for representing dependencies.	6
7	Regularization: The Problem of overfitting, Cost function, Regularized linear regression, Regularized logistic regression	4
8	K-Nearest Neighbours: Introduction, KNN algorithm, Parameter selection , KNN as Classifier, KNN as Regressor, Applications	4
9	Machine Learning System Design: Error analysis, Error metrics for skewed classes, Trading off precision and recall, Data for Machine Learning	4
Total lectures		42

Suggested Text Book(s):

1. C. Bishop: Pattern Recognition and Machine learning, Springer, 2006.
2. H. Daume: A course in Machine leaning, 2015.
3. Ethem Alpaydin, "Introduction to Machine Learning", Second Edition, The MIT Press, Cambridge, 2010.

uggested Reference Book(s):

1 T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2013.

2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC, 2014.

Other useful resource(s):

1. Link to NPTEL course contents: Introduction to Machine Learning https://onlinecourses.nptel.ac.in/noc17_cs26/preview
2. Link to MITOPENCOURESEWARE: Machine Learning
   https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO (Introduction to Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	3	2	2	2	2	2	1	1	2	3	3	2.17
CO2	3	3	3	2	3	2	2	1	1	2	3	3	2.33
CO3	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO4	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO5	3	3	3	3	3	3	3	1	3	3	3	3	2.83
Average	3.00	3.00	2.80	2.60	2.80	2.60	2.60	1.00	2.20	2.60	3.00	3.00	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Machine Learning for Wireless Communication

COURSE CODE: 20B1WEC732

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of communication system

Course Objectives:

1. To understand the fundamentals of machine learning.
2. To understand the various technologies employed in wireless communication system.
3. Apply the machine learning in different field of engineering.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand the basics of machine learning	Familiarity
CO-2	Analyze the behavior of wireless channel	Assessment
CO-3	Able to understand various technology of wireless communication	Assessment
CO-4	Design and develop various machine learning algorithm in the field of wireless communication.	Usage

Course Contents:

Unit	Contents	Lectures required
1	ML overview, What is machine learning, How it works, Different types of Machine Learning, ML challenge, Supervised ML, Unsupervised learning, Deep reinforcement learning.	8
2	Data Scrubbing, Setting up Data, Regression Analysis, Clustering, Bias & Variance, Artificial Neural Networks, Decision Trees.	8
3	Overview of communication system, wireless channel fundamentals, Performance parameters of wireless channel.	8
4	Advanced Technology used in wireless communication: CRN, OFDM and MIMO	10
5	Application of Machine learning in recent technology of wireless communication, mini project work.	8
Total lectures		**42**

Suggested Text Book(s):

1. Wireless Communications – Principles and Practice; by Theodore S Rappaport, Pearson Education Pte. Ltd., Delhi
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005
3. Machine Learning for future wireless communication by Fa Long Lo

Suggested Reference Book(s):

1. Fundamentals of Wireless Communication by Tse David and Viswanath Pramod, Cambridge University press, Cambridge
2. Mobile Communications; By: Schiller, Jochen H, Addison Wesley Longman Pte Ltd., Delhi

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3. Machine Learning Paradigms for Next-Generation Wireless Networks

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Machine Learning for Wireless Communication)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	3	1	1	1	1	2	2	3	**1.75**
CO-2	3	3	2	2	2	2	2	1	2	2	1	2	**2**
CO-3	3	1	2	1	2	2	2	2	2	3	1	1	**1.83**
CO-4	3	3	2	2	2	2	1	2	1	2	2	1	**1.91**
Average	**2.5**	**2.25**	**2**	**1.75**	**2.25**	**1.75**	**1.5**	**1.5**	**1.5**	**2.25**	**1.5**	**1.75**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Biological Computation

COURSE CODE:18B11BI313

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: Introduction to Bioinformatics

Course Objectives:

1. To use & develop tools to curate (compare &analyze) biological data.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Basic algorithms used in Pairwise and Multiple alignments.	Usage
CO-2	Understanding the methodologies used for database searching, and determining the accuracies of database search.	Usage
CO-3	Application of probabilistic model to determine important patterns.	Familiarity
CO-4	Prediction of structure from sequence and subsequently testing the accuracy of predicted structures.	Usage
CO-5	Determine the protein function from sequence through analyzing data.	Usage
CO-6	Analysis and development of models for better interpretation of biological data to extract knowledge.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction** Meaning of sequence, sequence similarity, homology, meaning of alignment.	1
2	**Pairwise Sequence Alignment**Different scoring models, Substitution matrices (PAM and BLOSUM), Pairwise Alignment: Concept of Global and Local Alignment, Dot matrix method, Dynamic programming (Needleman-Wunsch algorithm, Smith-Waterman algorithm, Choosing of best scoring matrix, gap penalties, Significance of score, EVD, FASTA and BLAST algorithms, Information theory and Shanon Entropy.	13
3	**Multiple Sequence alignment**Multiple Sequence Alignment methods (MSA), Scoring of a MSA, Progressive (CLUSTALW and PILEUP), Iterative (Genetic) and Hidden Markov Model (HMM) methods of MSA, Local MSA (Profile and BLOCK analysis, and Pattern searching, and Expectation Maximization (EM) Algorithm (MEME) and Gibbs Sampler.	6
4	**Structural Alignment Tools and Protein Tertiary Structure Prediction** Structure alignment algorithms & Homology modeling.	3

Approved in Academic Council held on 25.10.2018
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

5	**Markov Chains and HMM** Frequent words in DNA, Consensus word analysis, Transaction and emission matrix, Development of training set, CpG island prediction using HMM, Application of HMM in gene finding, and Multiple sequence alignment by HMM method.	7
6	**Phylogenetic Analysis** Phylogenetic tree and terminology, different methods of Phylogenetic tree prediction: maximum parsimony, distance (UPGMA, NJ), maximum likelihood methods, bootstrapping, Jacknifing and Phylogenetic analysis by using Bayesian Network.	7
7	**RNA Structure Analysis** Terminology of RNA secondary structure, inferring structure by comparative sequence analysis, RNA secondary structure prediction, Nussinov folding algorithm, energy minimization and Zuker folding algorithm.	5
Total lectures		**42**

Suggested Text Book(s):

1. D.W. Mount *Bioinformatics: Genome and Sequence Analysis*: (2001) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
2. Ian Korf, Mark &Josaph: *BLAST*, Oreilly Publisher, 2003
3. R. Durbin, S. Eddy, A. Krogh and G. Mitchison, *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids.* Cambridge University Press.
4. A.D. Baxevanis& B.F.F. Oulette*Bioinformatics – A practical guide to the Analysis of Genes and Proteins*,2002, Willey International publishers.
5. M.J. Bishop and C.J. Rawlings (editors), *DNA and Protein Sequence Analysis---A Practical Approach* IRL Press at Oxford University Press, ISBN 0 19 963464 7 (Pbk)
6. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York

Suggested Reference Book(s):

6. J. Setubal and J. Meidanis(1997) *Introduction to Computational Molecular Biology,* PWS Publishing Co.
7. J. Pevsner (2002) Bioinformatics and Functional Genomics; Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc19_bt01/preview

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Biological Computation)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-2	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-3	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-4	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-5	3	3	3	3	3	1	1	-	1	1	1	3	1.9
CO-6	3	3	3	3	3	1	1	-	1	1	1	3	1.9
Average	3	3	3	3	3	1	1	-	1	1	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Foundation for Data Science and Visualization

COURSE CODE: XXXXXXXX COURSE CREDITS: 2 CORE/ELECTIVE: ELECTIVE L-T-P: 2-0-0

Pre-requisite: Basic knowledge of high school mathematics and reasonable programming experience.

Course Objectives:

- Asking the correct questions and analyzing the raw data.
- Modeling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and find the final result.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understanding the basics of data science	Familiarity
CO-2	Using versatile and flexible languages (Python and R programming) for supporting data science	Usage
CO-3	Using data processing for collecting and manipulating the data into the usable and desired form	Usage
CO-4	Using data visualization to easily access the huge amount of data in visuals	Usage
CO-5	Using statistics to collect and analyze the numerical data in a large amount and finding meaningful insights from i	Usage
CO-6	Understanding linear algebra to represent, model, synthesize and summarize the complex data	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Data Science an Introduction:** Computer Science, Data Science, and Real Science, What is Data Science? Need for Data Science, Data Science Components, Tools for Data Science. Data Science Lifecycle, Applications of Data Science	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

2	**Python and R Programming for Data Science for Data Science:** Introduction to Python Programming (Python Basics, Python Data Structures, Python Programming Fundamentals, Working with Data in Python, Working with NumPy, Pandas, SciPy, and Matplotlib). Introduction to R Programming (R basics, Data structures in R, R Programming fundamentals, Working with Data in R, Stings, and Dates in R, Discover R's packages to do graphics)	5
3	**Data Processing:** Data Operations, Data cleansing, Processing CSV Data, Processing JSON Data, Processing XLS Data, Relational databases, NoSQL Databases, Date and Time, Data Wrangling, Data Aggregation, Reading HTML Pages, Processing Unstructured Data, Word tokenization, Stemming and Lemmatization	5
4	**Statistical Data Analysis:** Measuring Central Tendency, Measuring Variance, Normal Distribution, Binomial Distribution, Poisson Distribution, Bernoulli Distribution, P-Value, Correlation, Chi-square Test, Linear Regression	5
5	**Linear Algebra:** Visualizing Matrix Operations (Matrix Addition, Matrix Multiplication, Applications of Matrix Multiplication, Identity Matrices and Inversion, Matrix Inversion and Linear Systems, Matrix Rank) Factoring Matrices (Why Factor Feature Matrices, LU Decomposition, and Determinants), Eigenvalues and Eigenvectors (Properties of Eigenvalues, Computing Eigenvalues), Eigenvalue Decomposition (Singular Value Decomposition, Principal Components Analysis)	5
6	**Data Visualization:** Chart Properties, Chart Styling, Box Plots, Heat Maps, Scatter Plots, Bubble Charts, 3D Charts, Time Series, Geographical Data, Graph Data	6
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Data Science from Scratch by Joel Grus
- Data Science for Dummies by Lillian Pierson and Jake Porway
- An Introduction to Statistical Learning by Gareth James, Daniela Witten, et al.

Reference Book(s):

- An Introduction to Probability and Statistics by V.K. Rohatgi & A.K. Md. E.Saleh, Wiley, (2008), 3rd ed.
- Introduction to Probability Theory and Statistical Inference by H.J. Larson, John Wiley & Sons, (2005) 3rd ed.

Other useful resources (s):

- https://nptel.ac.in/courses/110/106/110106064/
- https://onlinecourses.nptel.ac.in/noc18_cs28/pr eview

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Foundation for Data Science and Visualization)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	1	1	1	3	2	2	1	1.8
CO-2	3	3	3	3	3	1	1	2	2	2	1	1	2.1
CO-3	2	2	2	2	1	1	2	2	2	2	1	2	1.8
CO-4	3	3	3	3	2	1	1	3	2	3	3	2	2.4
CO-5	3	2	3	3	1	1	2	1	1	3	2	1	1.9
CO-6	2	2	1	2	2	2	3	2	1	2	3	1	1.9
Average	2.5	2.3	2.3	2.7	1.8	1.2	1.7	1.8	1.8	2.3	2	1.3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Compression

COURSE CODE: 18B1WCI532

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Digital image processing, UG mathematics, vectors, basic programming skills

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques" case studies	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction**: Definitions, Historical background, Applications, Taxonomy	2
2	**Intuitive Compression:** Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move-to Front Coding, Scalar Quantization	4
3	**Statistical Methods Information:** Theory Concepts, Variable- Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, Shannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic coding, Adaptive Arithmetic Coding, QM Coder, Text Compression, Context-Tree Weighting	5
4	**Dictionary Methods:** String Compression, Simple Dictionary Compression, LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1,LZRW 4, LZW, LZMW, LZAP, LZY, LZP,	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Repetition Finder, UNIX Compression, The V.42bis Protocol, XML Compression: XMill, EXE Compressors, CRC, Data Compression Patents	
5	**Image Compression:** Approaches to Image Compression; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Simple Images: EIDAC, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context-Based Methods, FELICS, Progressive FELICS, Differential Lossless Compression	6
6	**Wavelet Methods:** Fourier Transform, The Frequency Domain, Fourier Image, Compression, Multiresolution Decomposition, The Laplacian Pyramid, SPIHT, CREW. EZW, DjVu, JPEG 2000	6
7	**Video Compression:** Analog Video , Composite and Components Video, Digital Video, Video Compression, MPEG, MPEG-4, H.261 **Audio Compression:** Sound, Digital Audio, The Human Auditory System , μ-Law and A-Law Companding, ADPCM Audio Compression, MLP Audio, Speech Compression, Shorten MPEG-1 Audio Layers	7
8	**Other Methods and Application:** Zip and Gzip, PNG, The Burrows-Wheeler Method, Symbol Ranking, ACB, SortBased Context Similarity, Sparse Strings, Word-Based Text Compression, Textual Image Compression, Dynamic Markov Coding, FHM Curve Compression, Sequitur, Triangle Mesh Compression: Unicode Compression	6
Total Lectures		**42**

Suggested Text Book(s):

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006

Suggested Reference Book(s):

1. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
2. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
3. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
4. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
2. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course Outcomes (Data Compression)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	3	2	3	3	3	3	1	2.4
CO-2	2	2	2	2	3	3	2	3	3	3	1	3	2.4
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.3	2.6	3	2.3	2.7	2.7	3	2.4	2.6	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Python Programming with Raspberry PI

COURSE CODE: 18B11CI315

COURSE CREDITS: 3

: 3-0-0

Pre-requisite: None

Course Objectives:

Raspberry Pi chose Python as its teaching language of choice to encourage a new generation of programmers to learn how to program. This approachable book serves as an ideal resource for anyone wanting to use Raspberry Pi to learn to program and helps you get started with the Python programming language. Aimed at first-time developers with no prior programming language assumed, this beginner book gets you up and running.

1. Covers variables, loops, and functions
2. Addresses 3D graphics programming
3. Walks you through programming Mine craft
4. Zeroes in on Python for scripting.

Course Outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Introducing Raspberry pi: what is programming, why raspberry pi, introducing the raspberry pi	Familiarity
CO-2	Introducing Python: Scripting vs. a Programming Language, The Python Philosophy, Getting Started with Python, Python basics, Programming with Python	Assessment
CO-3	Graphical Programming: Graphical User Interface (GUI) Programming, Adding Controls, Creating a Web Browser, Adding Window Menus, the web bolt, Calculating the Distance of the Point from the Light Source.	Assessment
CO-4	Creating games: building a game, installing Pi game, creating a worlds, detecting collisions, adding sound, adding scenery, adding the finishing touches, realistic game physics, Calculating Reflecting Angles, Building the 3D Model, Speaking to Your Pi.	Usage
CO-5	Networked Python: Understanding Hosts, Ports, and Sockets, Locating Computers with IP Addresses, Building a Chat Server, Tweeting to the World.	Familiarity
CO-6	Multimedia: Using Pi Audio to Get Sound into Your Computer, Recording the Sound, Speaking to Your Pi, Making Movies, Adding Computer Vision Features with Open CV, Creating Live Streams.	Usage

Course Contents:

Unit	Contents	Lecture required
1	Introduction: what is programming, why raspberry pi, introducing the raspberry pi	3
2	Introducing Python: Scripting vs. a Programming Language, The Python Philosophy, Getting Started with Python, Python basics, Programming with Python	9

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

3	Graphical Programming: Graphical User Interface (GUI) Programming, Adding Controls, Creating a Web Browser, Adding Window Menus, the web bolt, Calculating the Distance of the Point from the Light Source.	9
4	Creating games: building a game, installing Pi game, creating a worlds, detecting collisions, adding sound, adding scenery, adding the finishing touches, realistic game physics, Calculating Reflecting Angles, Building the 3D Model, Speaking to Your Pi.	1
5	Networked Python: Understanding Hosts, Ports, and Sockets, Locating Computers with IP Addresses, Building a Chat Server, Tweeting to the World.	6
6	Multimedia: Using Pi Audio to Get Sound into Your Computer, Recording the Sound, Speaking to Your Pi, Making Movies, Adding Computer Vision Features with Open CV, Creating Live Streams.	4
7	Scripting: Getting Started with the Linux Command Line, Using the Sub process Module, Command-Line Flags, and Scripting with Networking.	3
8	Interfacing with hardware and testing and debugging: Setting Up Your Hardware Options, Sneed of hardware, Finding Bugs by Testing, Checking Bits of Code with Unit Tests, Using Test Suites for Regression Testing, Making Sure Your Software's Usable.	2
Total Lectures		**42**

Suggested Text Book(s):

1. **Learning Python with Raspberry Pi** By Alex Bradbury, Ben Everard
2. **Learn Raspberry Pi Programming with Python** By Wolfram Donat

Suggested Reference Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle& Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc18_cs35/preview
2. https://nptel.ac.in/courses/106106145/
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to- computer-science-and-programming-in-python-fall-2016/index.htm
4. https://docs.python.org/3/tutorial/index.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

*In Test-I Paper the 20% of 15 Marks will be allocated to Introduction to Computers portion and 80% of 15 Marks will be allocated toIntroduction to Programming portion.

#In Test-II Paper the 20% of 25 Marks will be allocated tosyllabus of Test-I and 80% of 25 Marks will be allocated tofurther covered portion.

$In Test-III Paper the 40% of 30 Marks will be allocated to syllabus of Test-I+ Test-II and 60% of 30 Marks will be allocated to further covered portion.

`Internal Assessment will purely be focused on the assignments and quizzes based on Python Programming.

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Python Programing with Raspberry PI)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	3	3	2	1	1	1	3	**2.1**
CO-2	3	3	3	1	2	3	3	3	2	1	1	3	**2.3**
CO-3	3	3	3	1	2	3	2	3	2	1	1	3	**2.3**
CO-4	3	3	3	3	3	3	3	2	2	1	1	3	**2.5**
CO-5	3	3	3	2	2	3	3	3	2	1	1	3	**2.4**
CO-6	3	3	3	2	3	2	3	2	2	1	1	3	**2.3**
Average	**3**	**2.8**	**3**	**1.7**	**2.3**	**2.8**	**2.8**	**2.5**	**1.8**	**1**	**1**	**3**	

Python Programing with Raspberry PI (Lab)

COURSE CODE: 18B11CI311

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • H.P.

Python Programming Essentials

COURSE CODE: 18B11CI314

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Provide an understanding of the role computation can play in solving problems.
2. Help students, including those who do not plan to major in Computer Science and Electrical Engineering (like BI and BT), feel confident of their ability to write small programs that allow them to accomplish useful goals.
3. Position students so that they can compete for research projects and excel in subjects with programming components.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Familiarity about concepts of Python Programming. Broaden the knowledge about Variables, expressions and Functions in Python.	Familiarity
CO-2	Broaden the knowledge about Branching and Iteration. To have hands on skills on String Manipulation, Guess and Check, Approximations, Bisection	Assessment
CO-3	To learn about Decomposition Abstractions, Tuples, Lists, Dictionaries and Illustrative programs:	Assessment
CO-4	Files, Modules, Packages and Testing, Debugging, Exceptions, Assertions:	Usage
CO-5	Understanding and analyzing Object Oriented Programming:	Familiarity
CO-6	To have hands on skills on Illustrative programs(examples Sorting and Searching, Regular expressions) and GUI	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Informal introduction to Python programming language:** What is a program?, What is debugging?, Formal and natural languages, Downloading and installing Python., The first program, Debugging **Variables, expressions and Functions in Python** Values and types, Variables, Variable names and keywords, Operators and operands, Expressions and statements, Interactive mode and script mode, Order of operations, String operations, Function calls, Type conversion functions, Math functions, Composition, Adding new functions, Definitions and uses, Flow of execution **Parameters and arguments**	5
2	**Branching and Iteration:** Loops, Multiple assignment, Updating variables, The while statement, Break **String Manipulation, Guess and Check, Approximations, Bisection:** String manipulation, Guess and check algorithms(e.g: find Square Root etc), Approximate solutions(e.g	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Successive approximation), Bisection method.	
3	**Decomposition, Abstractions:** divide and conquer (modules), Abstraction **Tuples, Lists, Dictionaries, Illustrative programs:** - Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; - Tuples: tuple assignment, tuple as return value; - Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram	7
4	**Files, Modules, Packages**: Files and exception: text files, reading and writing files, format operator, Packages, Illustrative programs: word count, copy file. **Testing, Debugging, Exceptions, Assertions:** Unit testing framework(unit test), debugger for Python program(pdb), Handling an exception	7
5	**Object Oriented Programming:** -Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects -OOP, continued: inheritance, polymorphism, operator overloading, abstract classes.	7
6	**Illustrative programs(examples):** • Sorting and Searching • Regular expressions ○ Match function ○ Search function ○ Matching vs. Searching ○ Modifiers ○ Patterns **GUI :** Introduction, Tkinter programming, Tkinter widgets	8
Total lectures		**42**

Suggested Text Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705

Suggested Reference Book(s):

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.
2. Chun, Wesley. Core python programming. Vol. 1. Prentice Hall Professional, 2001.
3. Zelle, John M. Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc., 2004.
4. Gold, Steve. "Python: Python Programming Learn Python Programming In A Day-A Comprehensive Introduction To The Basics Of Python & Computer Programming." (2016).

Other useful resource(s):

1. https://onlinecourses.nptel.ac.in/noc18_cs35/preview
2. https://nptel.ac.in/courses/106106145/

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0001-introduction-to-computer-science-and-programming-in-python-fall-2016/index.htm
4. https://docs.python.org/3/tutorial/index.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	*T-1	15	1 Hour.	Syllabus covered up to T-1
2	#T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	$T-3	35	2 Hours	Entire Syllabus
4.	~Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

*In Test-I Paper the 20% of 15 Marks will be allocated to Introduction to Computers portion and 80% of 15 Marks will be allocated to Introduction to Programming portion.

#In Test-II Paper the 20% of 25 Marks will be allocated to syllabus of Test-I and 80% of 25 Marks will be allocated to further covered portion.

$In Test-III Paper the 40% of 30 Marks will be allocated to syllabus of Test-I+ Test-II and 60% of 30 Marks will be allocated to further covered portion.

~Internal Assessment will purely be focused on the assignments and quizzes based on Python Programming.

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Python Programming Essentials)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	1	2	3	3	2	1	1	1	3	2.1
CO-2	3	3	3	1	2	3	3	3	2	1	1	3	2.3
CO-3	3	3	3	1	2	3	2	3	2	1	1	3	2.3
CO-4	3	3	3	3	3	3	3	2	2	1	1	3	2.5
CO-5	3	3	3	2	2	3	3	3	2	1	1	3	2.4
CO-6	3	3	3	2	3	2	3	2	2	1	1	3	2.3
Average	3	2.8	3	1.7	2.3	2.8	2.8	2.5	1.8	1	1	3	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:

   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements

2. Link to topics related to course:

   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	**2.4**
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	**2.3**
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	**2.5**
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	**2.4**
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	**2.7**
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	**2.6**
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	**2.5**
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Database Management Systems

COURSE CODE: 18B11CI313

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Introduction to Computer Programming, Discrete Mathematics, Data Structures

Course Objectives:

1. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
2. To understand and use data manipulation language to query, update, and manage a database.
3. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Explain the characteristics, architecture of database approach, its components, different data models and the examples of their usage.	Familiarity
CO-2	For a given query write relational algebra expressions for that query and optimize the developed expressions.	Usage
CO-3	For a given specification of the requirement, design the databases using E-R method and normalization.	Usage
CO-4	Determine the functional dependency between two or more attributes, compute the closure of a set of attributes, evaluate a proposed decomposition	Assessment
CO-5	Give examples of the application of primary, secondary, and clustering indexes, explain the theory and application of internal and external hashing techniques.	Assessment
CO-6	Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.	Assessment
CO-7	Familiarize with the security in databases and gaining familiarity with other popular databases used in the industry	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	5
2	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS -	15

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	MYSQL, ORACLE, DB2, SQL server. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. **Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	
3	**Storage strategies:** Indices, B-trees, hashing.	6
4	**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	9
5	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	5
6	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	3
Total lectures		42

Suggested Text Book(s):

1. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
2. "Database system concepts" Henry F Korth, Abraham Silberschatz, S. Sudurshan, McGraw-Hill Ellis

Suggested Reference Book(s):

1. "Database Systems: A Practical Approach to design, Implementation and Management". Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. Bipin C Desai, ?An Introduction to Database Systems?, Galgotia. Publications Pvt Limited, 2001
3. "An Introduction to Database Systems", C.J.Date, Pearson Education.
4. "A first course in Database Systems", Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
5. "Data Management: databases and organization", Richard T. Watson, Wiley.
6. " Data Modeling Essentials", Graeme C. Simxion, Dreamtech.

Other useful resource(s):

1. Link to NPTEL course contents:
   https://www.youtube.com/watch?v=EUzsy3W4I0g&list=PL9426FE14B809CC41
2. Link to topics related to course:
   a. https://www.tutorialspoint.com/dbms/database_normalization.htm
   b. https://www.igi-global.com/journal/journal-database-management/1072
   c. https://www.tutorialspoint.com/dbms/dbms_hashing.htm

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Database Management Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-2	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-3	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-4	3	2	3	1	2	2	2	2	1	2	1	2	1.9
CO-5	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-6	3	2	3	1	1	3	2	1	1	3	2	1	1.9
CO-7	3	3	2	1	1	3	3	1	3	3	3	1	2.3
Average	3	2.6	2.4	1.1	1.6	2.6	2.6	1.7	1.9	2.6	2	1.4	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Design and Analysis of Algorithms

COURSE CODE: 18B11CI412

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Data structure and algorithms

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.	Technical
CO-2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.	Technical
CO-3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.	Technical
CO-4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.	Technical
CO-5	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.	Technical
CO-6	Explain the ways to analyze randomized algorithms (expected running time, probability of error).	Technical
CO-7	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).	Technical

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters" theorem. Examples: Binary counter, Recursive Fibonacci in LogN	10
2	Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design	8

	of Algorithms; Illustrations of these techniques for Problem- Solving , Bin Packing, Knap Sack TSP. Heuristics characteristics and their application domains. Examples: Greedy and dynamic scheduling, Hoffman encoding, Dynamic programming: Longest common subsequence, Matrix chain multiplication, Dynamic programming: Bin packing, Knapsack, Dynamic programming: TSP, Branch and Bound TSP, Backtracking: SAT, Maze Sudoku solver, 8 queen	
3	Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Examples: Best first search, Binomial heap MST: Prims, Kruskal, Fibonacci heap MST: Tarjan, Lazy decrease key implementation and Dijkstra, MaxFlow/ MinCut Ford-Fulkersion	8
4	Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook"s theorem, Standard NP-complete problems and Reduction techniques. Examples: Set Cover, Vertex cover, Map coloring, chromatic number	8
5	Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems, beyond NP – P SPACE, Examples: Approximate matrix inversion, Randomized Eigen vector computation	8
Total lectures		**42**

Suggested Text Book(s):

1. Rntroduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.

Suggested Reference Book(s):

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition,
3. Michael T Goodrich and Roberto Tamassia, Wiley.
4. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs20/preview
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106101060/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Operating System

COURSE CODE: 18B11CI411

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: C/C++

Course Objectives:

1. To learn the mechanisms of OS to handle processes and threads and their communication.
2. To learn the mechanisms involved in memory management in contemporary OS.
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
4. To know the components and management aspects of concurrency management.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	An appreciation of the role of an operating system.	Familiarity
CO-2	Create processes and threads.	Assessment
CO-3	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.	Assessment
CO-4	For a given specification of memory organization develop the techniques for optimally allocating memory to processes by Increasing memory utilization and for improving the access time	Assessment
CO-5	Design and implement file management system.	Assessment
CO-6	For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. .	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	4
2	**Process:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.	4
3	**Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, Priority, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF	4
4	**Inter-process Communication:** Critical Section, Race Conditions, Mutual	10

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Exclusion, Hardware Solution, Strict Alternation, Peterson"s Solution, Lamport"s Bakery Algorithm, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader"s & Writer Problem, Dinning Philosopher Problem etc.	
5	**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker"s algorithm, Deadlock detection and Recovery.	4
6	**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.	6
7	**Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	5
8	**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms. **File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. **Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.	5
Total lectures		**42**

Suggested Text Book(s):

1. "Operating System Concepts" 9th Edition by Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. "Operating Systems: Internals and Design Principles" 9th Edition, William Stallings, Pearson.

Suggested Reference Book(s):

1. "Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. "Operating Systems: A Modern Perspective" 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India.
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106108101//
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106106144/
   ii. https://www.class-central.com/course/udacity-introduction-to-operating-systems-3419

Evaluation Scheme:

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Operating System)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Scripting Language for Bioinformatics

COURSE CODE: 18B11BI512

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: Basic programming principal

Course Objectives:

1. To apply, and develop scripting languages codes and implement them towards the analysis of biological data. Additionally to Develop web based applications for the problems in biology. All students will be able to develop their own websites.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to apply design principles to develop web based applications specially for biological data analysis	Familiarity
CO-2	To understand working on world wide web through implementations	Familiarity and Assessment
CO-3	Use various methods from computational biology to implement their programmatic versions	Assessment
CO-4	Able to design new web pages and web sites	Assessment and Usage
CO-5	Able to developed programs to describe and analyze problems in biology	Assessment and Usage

Course Contents:

Unit	Contents	Lecture Hours
1	Introduction to Internet and World Wide Web. An overview of scripting languages, with applications towards biological data and sequence analysis. Complexity of DNA problems and their computational implications and applications. Introduction to HTML, DHTML, XML. accessing different objects of the HTML page, Dynamic page generation, Cascading Style Sheets (CSS).	12
2	JAVASCRIPT: Document object model, Elements of the document object model, basic principles of JS, object based programming using JavaScript; data types and structures, array and string handling, function implementations, XML: DTD, XML schemas, XML document structure, retrieving data from database in XML format; various bio based versions of XML.	10
3	PHP: PHP beginning to advanced level, data types, array and string handling, mathematical expressions and functions in PHP, PHP programming (implementation of object model), Database connectivity using PHP.	12

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

4	Hands-on practice on above mentioned programming languages. Implementation of programming skills for solving problems in biology. Development of bioinformatics based small applications and web based applications.	8
Total Lectures		42

Suggested Text Book(s):

1. HTML the complete reference, 2004, TMH.
2. Beginning PHP and Professional PHP, 2009, Wrox, Wiley Dreamtech.
3. JavaScript: The complete Reference, 2004, TMH.

Suggested Reference Book(s):

1. Biological Sequence Analysis: Probabistic models of proteins and nucleic acids (1998) Durbin R., et al, Cambridge University press.
2. Many other reference and text books on these scripting languages available in the library.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Scripting Languages for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	1	3	2	2	2	1	3	2	3	2	**2.08**
CO-2	3	2	2	2	-	-	-	1	-	1	2	2	**1.88**
CO-3	3	3	3	3	2	2	1	1	2	1	-	2	**2.09**
CO-4	3	3	3	1	-	-	-	-	2	2	2	1	**2.13**
CO-5	3	2	2	2	2	2	-	-	-	2	-	1	**2.00**
Average	**2.8**	**2.4**	**2.2**	**2.2**	**2**	**2**	**1.5**	**1**	**2.33**	**1.6**	**2.33**	**1.6**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

13B1WCI731: ARM Based Embedded System Design

Course Credit: 3
Semester: VII

Introduction

ARM designs the world's most popular processor architecture for embedded systems. The technology can be found at the heart of advanced digital products, from wireless, networking and consumer entertainment solutions to imaging, automotive, security and storage devices. This course is designed to provide the necessary knowledge to develop software for an ARM based system targeted in embedded software development. Topics cover the software aspects of ARM system which including assembly and C language programming and an introduction to the control and interfacing of embedded systems. Upon completion, students will understand the ARM architecture development, and will be familiar with supporting hardware and embedded system development process.

Course Objectives (Post-conditions)
Knowledge objectives:

1. Describe the architecture of a typical embedded RISC processor (e.g. ARM Cortex-M3)
2. Develop an understanding of the instruction set and addressing modes
3. Write programs that exercise a range of typical microcontroller peripherals (e.g. GPIO, USART, ADC, etc...)
4. Use a typical toolchain to implement and test simple embedded microcontroller applications in C and assembly language
5. Evaluate the requirements for embedded Real Time Operating Systems (RTOS)
6. Understand the structure of a RTOS (e.g. eLinux)

Application objectives:

1. Introduction to embedded systems, overview of the design flow
2. Embedded system specification and modeling
3. Embedded hardware platforms and peripherals
4. Interfacing to the external world through sensors and actuators
5. Design and synthesis of ASIC hardware
6. Software organization, scheduling, and execution
7. Embedded and real-time operating systems
8. Wired communication and bus protocols
9. Basics of wireless communication and embedded networking
10. Energy management and low-power design
11. Safety and reliability in embedded systems
12. Secure embedded system design

Expected Student Background (Preconditions)
C/C++ Programing, Assembly programming, Computer architecture, Digital design

Topics Outline:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

S NO	Topics	Hrs
1	Computer Architecture Introduction	4
2	ARM Software Development Tools and ARM Architecture Fundamentals	4
3	ARM Instruction Set Architecture and Addressing Mode	5
4	ARM Assembly Language Programming Basics	4
5	More on ARM Assembly Language Programming	3
6	The Thumb Instruction Set	4
7	Exception and Interrupt Handling	3
8	ARM Processor Architecture	4
9	Startup Sequence and ARM Based Hardware Consideration	2
10	Introduction to Debug Tools for ARM Based Systems	2
11	ARM Test Revision	2
12	ARM on virtual machine	2
13	ARM Exam Revision	2
	Total	41

References

1. ARM Architecture Reference Manual (local copy)
   ARM7TDMI Technical Reference Manual (local copy)
   ARM7TDMI Instruction Set Reference (local copy)
2. ARM7TDMI Quick Reference (local copy)
3. An Introduction to the GNU Assembler
4. An Introduction to the GNU Compiler
5. An Introduction to GNU Debugger
6. ARMv4T Partial Instruction Set Summary
   Pete Cockerell has put the text of his 1987 book "ARM Assembly Language Programming" on the web (local copy)
7. A book by Peter Knaggs and Stephen Welsh, ARM: Assembly Language Programming @2004 - download for free (local copy)
8. ARM System-On-Chip Architecture (2nd Edition) by Steve Furber (the father of the ARM processor) - download for free (local copy)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Evaluation Scheme:

S.No	Examination	Marks
1	T-1	15
2	T-2	25
3	T-3	35
4	*Internal Marks	25

*Internal Marks Breakdown:

Assignments	9 marks (3x3)
Quizzes	12 marks (3x4)
Regularity	4 Marks

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Compiler Design

COURSE CODE: 18B11CI612

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisites: Perquisite for this course is programming languages like C, C++, java and basic knowledge of formal language and automata theory. This is a programming-intensive course. The primary languages used are C and Java and familiarity with them is assumed.

Course Objectives:

1. To understand the basic concept of compilation particular, lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation.
2. Ability to create lexical rules and grammars for a programming language.
3. Ability to use flex or similar tools to create a lexical analyzer and Yacc/Biscon tools to create a parser
4. Ability to implement a various parser such as a bottom-up SLR parser without using any compiler-generation tools
5. Ability to implement a various intermediate code generation techniques without using any compiler generation tools
6. Ability to implement various code optimizing techniques without using any compiler-generation tools
7. Ability to implement semantic rules into a parser that performs attribution while parsing
8. Ability to design a compiler for a concise programming language.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the basic concept of compilation particular, lexical analyzer, syntax and semantic analysis, code generation and optimization phases of compilation	Familiarity
CO-2	Ability to create lexical rules and grammars for a programming language	Familiarity
CO-3	Ability to use flex or similar tools to create a lexical analyzer and Yacc/Biscon tools to create a parser	Computational skills
CO-4	Ability to implement a various parser such as a bottom-up SLR parser without using any compiler-generation tools	Technical skills
CO-5	Ability to implement a various intermediate code generation techniques without using any compiler generation tools	Technical skills
CO-6	Ability to implement various code optimizing techniques without using any compiler-generation tools	Technical skills
CO-7	Ability to implement semantic rules into a parser that performs attribution while parsing	Assessment
CO-8	Ability to design a compiler for a concise programming language	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Compilers, Analysis of Source Program, Phases of Compiler, Issues in a Compiler Structure, Major Data Structures in Compiler, Bootstrapping and Porting	3
	Lexical Analysis: Role of the Lexical Analyzer, Scanning Process- Input Buffering, Specification of Tokens, Recognition of Tokens, Regular Language,	

2	Finite Automata, Regular Expression, Regular Expression to Finite automata, Scanner Generator (lex, flex)	4
3	**Syntax Analysis:** Parsing Process, Context-Free Grammar, Handle, Ambiguity, Parse Tree, Push-Down Automata , Top Down Parsing: Basic Concept, Recursive Descent Parsing, First Function, Follow Function, Conflicts-Shift Reduce, Reduce-Reduce, LL(1) Grammar, LL(1) Parser, Error Recovery, Bottom up parsing :Basic Concept, Shift Reduce Parsing, Operator Grammar, Operator Precedence Parsing, Augmented Grammar, LR(0) Item Set, LR(0) Parsing, LR(1) Item Set, SLR(1) Parsing, Canonical LR Parser, LALR parsing, Error Recovery, YACC and BISON	12
4	**Semantic Analysis:** Syntax-Direct Definitions, Implementation of Syntax-directed Translators, Bottom-up Evaluation of S-attributed Definitions, L-attributed Definitions, and Top-down Translation	5
5	**Intermediate Code Generation:** Postfix Notation, Parse Trees & Syntax Trees, Three Address Code, Quadruple & Triples, Translation of Assignment Statements, Boolean Expressions, Statements That Alter Flow of Control, Postfix Translation, Array References in Arithmetic Expressions, Procedures Call, Declarations and Case Statements	5
6	**Code Generation: Issues** in the design of a Code Generator, Target Machine, Run-Time Storage Management, Basic blocks and Flow graphs	4
7	**Code Optimization:** Machine-Independent Optimizations, Machine Dependent Optimization, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis	5
8	**Run-time environment and Symbol:** Procedure activation, parameter passing, value return, memory allocation, and scope, Symbol Table, Definition, Structure, Types, symbol attributes and management	4
Total Lectures		42

Suggested Text Book(s):

1. Compilers: Principles, Techniques, and Tools by Alfred V. Aho, Monica S. Lam, Ravi Sethi, and Jeffrey D. Ullman, Pearson Publisher
2. Compiler Construction, Kenneth C. Louden, 582 pages
3. Modern Compiler Implementation in C, Andrew W. Appel, 544 pages

Suggested Reference Book(s):

1. http://ecomputernotes.com/compiler-design
2. http://www.diku.dk/~torbenm/Basics/basics_lulu2.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Compiler Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	1	2	3	3	2	1	3	2	1	**2.1**
CO-2	3	3	2	1	1	3	3	1	3	3	3	1	**2.3**
CO-3	3	3	2	1	2	2	2	1	2	3	3	2	**2.2**
CO-4	3	3	3	2	2	2	3	2	2	1	2	2	**2.3**
CO-5	3	3	3	2	2	2	2	2	1	3	2	1	**2.2**
CO-6	3	3	3	3	2	3	3	2	2	3	2	2	**2.6**
CO-7	3	3	3	3	2	3	3	1	2	3	2	2	**2.5**
CO-8	3	3	3	3	2	3	3	2	2	2	3	2	**2.6**
Average	**3**	**2.9**	**2.6**	**2**	**1.9**	**2.6**	**2.8**	**1.6**	**1.9**	**2.6**	**2.4**	**1.6**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Computer Networks

COURSE CODE: 18B11CI611

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisites: None

Course Objectives:

1. The course introduces the concepts and fundamental design principles of modern computer networking, focusing on the Internet"s architecture and protocols.
2. The course introduces the concepts of data and computer communications, computer network introduction and its applications in our real life.
3. Reference models such as OSI and TCP/IP and its way toward the physical layer concepts, data link layer and its protocols, multiple access protocols.
4. Provide students Network layer and its different routing protocols, the concepts/design of IP addressing.
5. To provide students Transport layer and its protocols such as TCP, UDP and SCTP to application layer and its protocol such as HTTP, FTP, SMTP and DNS.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in computer networks	Familiarity
CO-2	To learn about the layered models in computer networks and different types of network topologies and protocols	Assessment
CO-3	To learn about the data link layer and MAC layer protocols and related issues	Assessment
CO-4	To learn concepts associated with subnetting and routing mechanisms. Understand network industry standards such as: Routing Protocols, Address Resolution and Reverse Address Resolution Protocols, IP Addresses and Subnetting, MAC Addressing.	Assessment
CO-5	To learn about the transport layer protocols and related issues	Assessment
CO-6	You will learn about the session, presentation and application layers protocols.	Usage
CO-7	Further, to learn about the some advanced topics in networks such as Cryptographic algorithms, Network security and management, and concepts of wireless networks	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Computer Networks:** Network Software Architecture: layers and protocols, OSI vs. TCP, Network Model, Connection Oriented and Connectionless services, Network Topology, Delay.	4
2	**Physical Layer:** Transmission Terminology, Analog and Digital Signal, Transmission Impairments, Transmission Media, Modulation, Switching Techniques, Multiplexing Techniques	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3	**Data Link Layer:** Introduction and services to Data Link layer, Error detection and Correction techniques, Bit and Byte stuffing, Bit/Byte oriented protocol, Flow Control Mechanism, Multiple access protocol, Ethernet, Hubs and switches, Router and Gateways.	8
4	**Network Layer:** Network service model, Virtual circuit and Datagram networks, Logical Addressing and Sub-netting, Internet protocol: IPv4 and IPv6, ARP vs RARP, DHCP, Routing algorithms and standards, Internetworking, The network layer in the internet, Broadcast and multicast routing, Congestion Control Algorithms,	8
5	**Transport Layer:** Transport layer services and principles, End-to-end protocols: Issues and services, Multiplexing and De-multiplexing, Connectionless transport: UDP, Principles of reliable data transfer, Connection-oriented Transport: TCP, SCTP, Principles of congestion control, TCP Congestion Control, Quality of services.	8
6	**Application Layer:** Principle of application layer protocols, WWW and HTTP, FTP, Telnet, SMTP, DNS etc.	3
7	**Some Advanced Topics:** Symmetric-key algorithms, Public key algorithms, RSA, Digital Signatures, Communication security, authentication protocols, Web security, Wireless LAN, Mobile IP, Introduction to Multimedia networking, Network management.	3
Total lectures		42

Suggested Text Book(s):

1. Andrew S. Tanenbaum, "Computer Networks" 4th Edition PHI
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet" 3rd Edition Pearson Education

Suggested Reference Book(s):

1. UNIX Network Programming, Volume 1, Second Edition: Networking APIs: Sockets and XTI, Prentice Hall, 1998, ISBN 0-13-490012-X.
2. Arnold Robbins, "UNIX in a Nutshell", O"Reilly 4th Edition
3. David I. Schawartz, "Introduction to UNIX", Prentice Hall, Second Edition
4. BEHROUZ a. Forouzan and Richard F. Gilberg, "UNIX and Shell Programming: A Textbook"
5. NS Simulator for Beginner"s, Lecture notes Univ. de Los Andes, France.
6. Angela Orebaugh, Gilbert Ramirez,Josh Burke, Larry Pesce, Joshua Wright, Greg Morris, "Wireshark & Ethereal Network Protocol Analyzer Toolkit", Syngress Publishing, Inc.

Other useful resource(s):

3. Link to topics related to course:
   i. https://www.coursera.org/specializations/networking-basics
   ii. https://nptel.ac.in/courses/106105080/
   iii. https://swayam.gov.in/course/4066-computer-networks

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Computer Networks)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-7	3	3	3	2	2	3	3	2	2	3	1	3	2.5
Average	3	3	3	2	2.6	2.9	2.1	2	2.4	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Analytics

COURSE CODE: 18B1WCI843

COURSE CREDIT: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisites: Linear algebra, calculus, probability theory and statistics

Course Objectives:

Data Analytics is the science of analyzing data to convert information to useful knowledge. This knowledge could help us understand our world better, and in many contexts enable us to make better decisions. While this is the broad and grand objective, the last 20 years has seen steeply decreasing costs to gather, store, and process data, creating an even stronger motivation for the use of empirical approaches to problem solving.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Gaining factual knowledge regarding data acquisition, data cleansing, and various aspects of data analytics and visualization	Familiarity
CO-2	Learning the principles of data analytics and its underlying methods and algorithms	Assessment
CO-3	Learning to apply the methods of data collection and data analytics to solve business and related problems in support of business decision- making	Assessment
CO-4	Developing the skills necessary to use related software tools to perform data collection, cleansing, and analytics	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to the course, Descriptive Statistics, Probability Distributions	5
2	Inferential Statistics through hypothesis tests, Permutation & Randomization Test	4
3	Regression, ANOVA(Analysis of Variance)	5
4	Differentiating algorithmic and model based frameworks Regression : Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbours Regression & Classification	7
5	Bias-Variance Dichotomy, Model Validation Approaches Logistic Regression, Linear Discriminant Analysis Quadratic Discriminant Analysis Regression and Classification Trees Support Vector Machines	8
6	Ensemble Methods: Random Forest, Neural Networks, Deep learning	4
7	Clustering, Associative Rule Mining, Challenges for big data anlalytics	4
8	Creating data for analytics through designed experiments, Creating data for analytics through Active learning Creating, data for analytics through Reinforcement learning	5
Total lectures		**42**

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Reference Book(s):

1 Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: Springer, 2009.

2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc15_mg05/preview

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Data Analytics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Mining and Data Warehousing

COURSE CODE: 18B1WCI635

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objective:

1. To describe the concept of Data warehouse & its attributes
2. To study different data warehouse models, architectures and implementation
3. To understand the basic concept of data mining and its functionality
4. To understand the concept of classification techniques and its implementation
5. To understand the concept of association rules, different techniques and implementation details
6. To understand the concept of cluster analysis, anomaly detection and its usage and implementation details

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To describe the concept of Data warehouse & its attributes	Assessment
CO-2	To study different data warehouse models, architectures and implementation	Assessment
CO-3	To understand the basic concept of data mining and its functionality	Assessment
CO-4	To understand the concept of classification techniques and its implementation	Assessment
CO-5	To understand the concept of association rules, different techniques and implementation details	Assessment
CO-6	To understand the concept of cluster analysis, anomaly detection and its usage and implementation details	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concepts of Data Warehouse and Data Mining including its functionalities, stages of Knowledge discovery in database(KDD) , Setting up a KDD environment, Issues in Data Warehouse and Data Mining, Application of Data Warehouse and Data Mining	5
2	**Architecture:** DBMS vs. Data Warehouse, Data marts, Metadata, Multidimensional data model, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations, Data Warehouse Architecture, Distributed and Virtual Data Warehouse, Data Warehouse Manager, OLTP, OLAP, MOLAP, HOLAP, types of OLAP, servers	6
3	**Introduction:** Data Mining, Motivation, Challenges, Origins of Data Mining, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity, Exploring Data: Iris Data Set, Summary Statistics,	3

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Visualization, OLAP and Multi dimensional Data Analysis	
4	**Classification:** Basic Concepts and Preliminaries, Approach to Solving a Classification Problem, Decision Tree Induction, Model Over fitting, Evaluating Performance of Classifier **Alternative Techniques**: Rule-Based Classifier, Nearest- Neighbour Classifiers, Artificial Neural Network (ANN), Support Vector Machine (SVM), Ensemble Methods, Class Imbalance Problem, Multiclass Problem	6
5	**Association Analysis:** Basic Concepts and Problem Definition, Frequent Itemset Generation, Rule Generation, Representation of Frequent Itemsets, FP-Growth Algorithm, Evaluation of Association Patterns, Handling Categorical Attributes , Handling Continuous Attributes, Handling a Concept Hierarchy, Sequential Patterns, Subgraph Patterns	6
6	**Cluster Analysis:** Basic Concepts, Characteristics of Data, Clusters, Partitional Clustering, Agglomerative Hierarchical Clustering, Prototype-Based Clustering, Density-Based Clustering, Graph-Based Clustering, Cluster Evaluation **Anomaly Detection:** Preliminaries, Statistical Approaches, Proximity-Based Outlier Detection, Density-Based Outlier Detection, Clustering-Based Techniques	6
Total lectures		**32**

Suggested Text Book(s):

1. Data Mining Concepts and Techniques J. Han and M. Kamber Morgan Kaufmann, 2006, ISBN 1-55860-901-6
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7

Suggested Reference Book(s):

1. Mining Massive data sets Anand Rajaram, Jure Leskovec and Jeff Ullman Cambridge University Press
2. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
3. https://www.coursera.org/specializations/data-mining.
4. https://www.futurelearn.com/courses/data-mining-with-weka

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	1.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO 2	3	3	3	3	3	3	2	3	3	1	1	3	**2.6**
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	**2.5**
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	**1.7**
CO 5	3	3	3	3	2	3	1	2	3	2	3	3	**2.6**
CO 6	3	2	1	2	2	1	2	2	2	1	1	2	**1.8**
Average	**3**	**2.3**	**2.2**	**2.3**	**2.2**	**2**	**1.5**	**2.2**	**2.3**	**1.5**	**1.8**	**2.5**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Design and Analysis of Algorithms

COURSE CODE: 18B11CI412

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Data structure and algorithms

Course Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.	Technical
CO-2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.	Technical
CO-3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.	Technical
CO-4	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.	Technical
CO-5	For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.	Technical
CO-6	Explain the ways to analyze randomized algorithms (expected running time, probability of error).	Technical
CO-7	Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).	Technical

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters" theorem. Examples: Binary counter, Recursive Fibonacci in LogN	10
2	Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design	8

	of Algorithms; Illustrations of these techniques for Problem- Solving , Bin Packing, Knap Sack TSP. Heuristics characteristics and their application domains. Examples: Greedy and dynamic scheduling, Hoffman encoding, Dynamic programming: Longest common subsequence, Matrix chain multiplication, Dynamic programming: Bin packing, Knapsack, Dynamic programming: TSP, Branch and Bound TSP, Backtracking: SAT, Maze Sudoku solver, 8 queen	
3	Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Examples: Best first search, Binomial heap MST: Prims, Kruskal, Fibonacci heap MST: Tarjan, Lazy decrease key implementation and Dijkstra, MaxFlow/ MinCut Ford-Fulkersion	8
4	Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook"s theorem, Standard NP-complete problems and Reduction techniques. Examples: Set Cover, Vertex cover, Map coloring, chromatic number	8
5	Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems, beyond NP – P SPACE, Examples: Approximate matrix inversion, Randomized Eigen vector computation	8
Total lectures		**42**

Suggested Text Book(s):

1. Rntroduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.

Suggested Reference Book(s):

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition,
3. Michael T Goodrich and Roberto Tamassia, Wiley.
4. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs20/preview
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106101060/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Foundations of Block Chain

Course Code: 19B1WCI839

Course Credit: 3-0-0

Course Pre-requisites (if any): Some programming experience (at least one year suggested). Potential students will need to pass a brief programming assessment for enrollment in the course.

Course Objectives:

S No	Course Outcomes (Block Chain Technologies) 18B1WCI836	Level of Attainment
CO-1	Explain how bitcoin works, from when a transaction is created to when it is considered part of the blockchain	Familiarity
CO-2	Thoroughly explain private and public keys as well as addresses and how exactly they are constructed and used	Familiarity
CO-3	Expose students to the different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading	Assessment
CO-4	Decompose a blockchain system's fundamental components, how they fit together and examine a modular blockchain system in more detail	Assessment
CO-5	Detailed understanding of naïve Attacks and Trustless Networks of block chain	Assessment
CO-6	Provide a thorough understanding of smart contracts, their technical capabilities, practical applications, limitations and security constraints they operate within	Usage
CO-7	Explain to students both fundamental and implied differences between Ethereum and Bitcoin protocol by covering historical, conceptual and architectural distinctions	Assessment

Detailed Course Contents:

Module	Contents	Lectures required
Module-1	**The story of a transaction** a) From Transactions to Blocks b) Blocks and Distributed Consensus c) Basic interaction with a Bitcoin node	2
Module-2	**Keys and Addresses** a) Basic cryptography b) From private keys to addresses	2
Module-3	**The Bitcoin Script language** a) Introduction to the Bitcoin Script language b) Script writing and execution c) Advanced scripting	8
	d) Tools and libraries to access Bitcoin's API and scripting capabilities **Blockchain deployment** a) Mining and forking	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	b) Upgrading the network c) Related BIPs d) Segregated Witness (SegWit)	
Module-4	**Blockchain architectures** a) Abstract Architecture b) Ways to dive deeper c) Introduction to major blockchain platforms	**6**
Module-5	**Comparing Bitcoin and Ethereum** a) Historical comparison b) Conceptual distinction between a payment system and a decentralized applications platform *c)* Differences in their architectures from *security-first aspect to a rich feature set* d) Future roadmap for them, following their own paths with probable interconnections	**8**
Module-6	**Development environment** a) Multitude of clients in Ethereum b) Production and test networks in Ethereum *c) Public, private and development deployments* **Contract code walk-through** a) Demonstration of smart contract b) Introduction to Solidity c) Contract lifecycle	**8**
Module-7	**Solidity in depth** a) Building blocks b) Popular contracts already in deployment **Considerations for production deployment** a) Quality of decentralized applications b) Code patterns *c) Security* d) Other smart contract platforms e) Discussion of future prospects	**8**
	TOTAL LECTURES	**42**

Suggested Text Book(s):

- Mastering Bitcoin, Andreas Antonopoulos, O'Reilly Publishing, 2014, ISBN: 978-0691171692.
- Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto, Online 2009 https://bitcoin.org/bitcoin.pdf
- Vitalik Buterin, Ethereum White Paper, Online, 2017, https://github.com/ethereum/wiki/wiki/ White- Paper

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Suggested Reference Book(s):

- Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, A. Narayanan, J.
- Bonneau, E. Felten, A. Miller, S. Goldfeder, Princeton University Press, 2016, ISBN: 978-0691171692
- The Science of the Blockchain, Roger Wattenhofer, CreateSpace Independent Publishing Platform, 2016, ISBN: 978-1522751830
- Ethereum Programming, Alex Leverington, Packt Publishing Limited, 2017, ISBN: 978- 1786463715

Other useful resource(s):

- Bitcoin Protocol Specifications (https://en.bitcoin.it/wiki/Protocol_specification)
- Bitcoin transaction Scripting (https://en.bitcoin.it/wiki/Script)
- Majority is not Enough: Bitcoin Mining is Vulnerable (http://arxiv.org/abs/1311.0243)
- Two Bitcoins at the Price of One? Double-Spending Attacks on Fast Payments in Bitcoin (http://eprint.iacr.org/2012/248.pdf)
- Ethereum documentation (http://www.ethdocs.org/en/latest)
- Solidity documentation ((https://solidity.readthedocs.io/en/develop))
- https://sites.google.com/site/blockchaintutorial/blockchain-course-content

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes (2) - 10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	83
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	86
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	81
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	83
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	81
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	86
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	81
Weightage	86	71	86	71	81	86	86	86	71	86	95	90	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Machine Learning

COURSE CODE: 18B1WCI634

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
2. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
3. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
4. Be able to design and implement various machine learning algorithms in a range of real-world applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in machine learning	Familiarity
CO-2	To learn about the definition of learning systems, their goals and applications in machine learning	Familiarity
CO-3	To understand concepts associated with classification and experimental evaluation of classification algorithms	Assessment
CO-4	To learn concepts associated with decision trees and experimental evaluation of classification algorithms	Assessment
CO-5	To learn about instance-based learning, clustering and unsupervised learning	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. **Inductive Classification:** The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm. Learning conjunctive concepts. The importance of inductive bias.	5
2	**Decision Tree Learning:** Representing concepts as decision trees. Recursive induction of decision trees. **Picking the best splitting attribute:** entropy and information gain.Overfitting, noisy data, and pruning, Linear regression	5
3	**Artificial Neural Networks:** Neurons and biological motivation. Perceptrons, Multilayer networks and back propagation. **Bayesian Learning:** Probability theory and Bayes rule. Naive Bayes learning algorithm. Logistic regression	5
4	**Support Vector Machine**, Kernel function and Kernel SVM **Instance-Based Learning:** Constructing explicit generalizations versus comparing to past specific examples. k-Nearest Neighbor algorithm. Case-based learning.	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

5	**Genetic Algorithm and Evolutionary Algorithms Introduction.** Representing hypothesis, Genetic Operators, Fitness function and selection. Hypothesis space search Genetic Programming	6
6	**Clustering and Unsupervised Learning:** Learning from unclassified data. Hierarchical Agglomerative Clustering. k-means partitioned clustering. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labeled and unlabeled data.	6
Total lectures		**32**

Suggested Text Book(s):

1. Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin.

Suggested Reference Book(s):

1. Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006
2. T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.
3. Ian H. Witten & Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufmann, 1999.
4. S. M. Weiss & C. A. Kulikowski, "Computer Systems that Learn", Morgan Kaufman Publishers, San Fancisco, CA, 1991

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs40/preview
2. Link to topics related to course:
   i. https://in.udacity.com/course/intro-to-machine-learning--ud120-india
   ii. https://www.edx.org/learn/machine-learning
   iii. https://www.datacamp.com/courses/introduction-to-machine-learning-with-r
   iv. https://www.simplilearn.com/big-data-and-analytics/machine-learning-certification-training-course

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Machine Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-4	3	3	3	2	3	3	2	2	2	3	1	3	2.5
CO-5	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	**3**	**3**	**3**	**2**	**2.8**	**2.8**	**2.2**	**2**	**2.2**	**3**	**1**	**3**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Object-Oriented Systems and Programming

COURSE CODE: 18B11CI311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To use object modelling technique to analyze problem requirements, design a solution to the problem andthen implement the solution in Object-Oriented Programming Language(s) or database.
2. To strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. To strengthen ability to design and represent solutions to problems using UML notations
4. To introduce object oriented concepts in C++ and Java.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the concepts of Objects, Classes, Methods, Constructors and Destructors	Usage
CO-2	To learn the designing of complex classes: Friend Functions and Static member functions, Inline functions, constant functions.	Usage
CO-3	To learn Inheritance: Single Inheritance, Multiple Inheritance, Multi-levelInheritance, Hierarchical Inheritance and Hybrid Inheritance.	Usage
CO-4	To learn the concept of Abstract classes and interfaces	Usage
CO-5	To learn the concepts of Operator overloading and conversion function	Usage
CO-6	To learn File Handling. Writing and reading data from the file, reading and writing the objects into the file.	Usage
CO-7	To learn the Exception Handling: try --catch and finally block, making user-defined exceptions.	Usage
CO-8	To learn the Unified Modeling Language (UML): Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Structured versus Object-Oriented programming, Object-Oriented paradigm. Defining Objects, Classes, Data members, Member functions, Constructors and Destructors in C++. Inline Functions, Friend Functions, Constant member functions, and Static members (static data and static member functions). Function overloading, Operator overloading and Conversion functions. Using the concepts of File handling	12
2	Polymorphism and Inheritance in C++. Abstract classes, virtual function, pure virtual functions, and virtual base classes in C++.	6
3	Function templates and Class templates	3
4	Introduction to Java and its features. Defining Classes in Java, Wrapper classes, Packages and Exception handling in Java	7
5	Inheritance and Interfaces in Java. Abstract class, abstract methods,	5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

	final class and final method in Java	
6	Basic principles of Software engineering. System analysis, design, testing and debugging. Unified Modeling Language (Class Diagram, Use Case Diagram, State Diagram, Sequenced Diagram, Communication Diagram, Activity Diagram)	9
Total lectures		**42**

Suggested Text Book(s):

1. Lafore R., Object oriented programming in C++, Waite Group
2. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
3. Satzinger, Jackson, Burd, Object-Oriented Analysis & Design

Suggested Reference Book(s):

1. Stroustrap B., The C++ Programming Language, Addison Wesley
2. Bruce Eckel, Thinking in C++
3. Bruce Eckel, Thinking in Java

Other useful resource(s):

1. Link to NPTEL course contents:

   a. https://onlinecourses.nptel.ac.in/noc16_cs17/preview
   b. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
   c. https://onlinecourses.nptel.ac.in/noc17_cs25/announcements

2. Link to topics related to course:

   a. https://www.tutorialspoint.com/cplusplus/
   b. http://www.cplusplus.com/doc/tutorial

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Internal Assessment	25	Entire Semester	Assignment Quizzes Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Object-Oriented Systems and Programming)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	3	3	2	3	3	3	2.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO-2	3	3	3	2	1	1	2	3	2	3	3	3	2.4
CO-3	3	3	2	2	2	1	2	2	2	3	3	3	2.3
CO-4	3	3	3	2	2	1	2	3	2	3	3	3	2.5
CO-5	3	3	3	3	2	1	2	3	2	1	3	3	2.4
CO-6	3	3	3	3	2	3	2	3	2	2	3	3	2.7
CO-7	3	3	2	2	2	3	3	2	2	3	3	3	2.6
CO-8	3	3	3	3	3	2	3	3	2	1	3	1	2.5
Average	**3**	**3**	**2.8**	**2.5**	**2**	**1.8**	**2.4**	**2.8**	**2**	**2.4**	**3**	**2.8**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Object Oriented Technologies using Java

COURSE CODE: 19B1WCI734

COURSE CREDITS: 2

ELECTIVE: OPEN ELECTIVE

: 2-0-0

Pre-requisite: Introduction to C Programming

Course Objectives:

Today almost every branch of computer science is feeling presence of object- orientation. Object oriented technology is successfully incorporated in various fields of computer science. Since its arrival on the scene in 1995, the Java has been accepted as one of the primary programming language. This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	Understanding the features and concepts of Object-Oriented Programming using Java	Familiarity
CO2	Defining classes, objects, constructors, methods in Java	Usage
CO3	Inheritance, Interfaces, and Polymorphism	Usage
CO4	Packages, Exception Handling, and Multithreading	Usage

Course Contents:

S No	Topics	Lectures required
1	Object-Oriented Concepts: Classes and Objects, Abstraction and Encapsulation, Inheritance, and Polymorphism.	2
2	Java Language Basics Introduction To Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type And Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators.	3
3	Expressions, Statements and Arrays Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump Statements, Arrays.	2
4	Class and Objects Class Fundamentals, Creating objects, Assigning object reference variables, Introducing Methods, Static methods,	5
	Constructors, Overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects, Method Overloading, Garbage Collection, The finalize () Method.	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

5	Strings and Characters Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using valueOf() Methods, String Buffer Class and Methods.	2
6	Inheritance and Polymorphism Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword.	4
7	Packages and Interfaces Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes, Extends and Implements Together.	3
8	Exceptions Handling Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses	3
9	Multithreaded Programming Multithreading: An Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter-thread Communication.	4
	Total	**28**

Suggested Text Book(s):

1. Java 2: The Complete Reference, Fifth Edition -- by Herbert Schildt
2. Bruce Eckel, Thinking in Java

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	35	2 hours	Syllabus covered upto Test-3
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	2	2	1	2	2	1	1	1	3	3	**1.75**
CO-2	1	1	3	1	3	3	3	1	2	1	1	3	**1.92**
CO-3	2	2	1	2	1	1	2	3	1	3	2	1	**1.75**
CO-4	1	3	3	3	3	3	1	1	2	1	2	1	**2**
Average	**1.5**	**1.75**	**2.25**	**2**	**2**	**2.25**	**2**	**1.5**	**1.5**	**1.5**	**2**	**2**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Data Mining and Data Warehousing

COURSE CODE: 18B1WCI635

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structures, Compilers, Operating Systems, Computer Networks, Machine Learning and Genetic Algorithms.

Course Objective:

1. To describe the concept of Data warehouse & its attributes
2. To study different data warehouse models, architectures and implementation
3. To understand the basic concept of data mining and its functionality
4. To understand the concept of classification techniques and its implementation
5. To understand the concept of association rules, different techniques and implementation details
6. To understand the concept of cluster analysis, anomaly detection and its usage and implementation details

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To describe the concept of Data warehouse & its attributes	Assessment
CO-2	To study different data warehouse models, architectures and implementation	Assessment
CO-3	To understand the basic concept of data mining and its functionality	Assessment
CO-4	To understand the concept of classification techniques and its implementation	Assessment
CO-5	To understand the concept of association rules, different techniques and implementation details	Assessment
CO-6	To understand the concept of cluster analysis, anomaly detection and its usage and implementation details	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concepts of Data Warehouse and Data Mining including its functionalities, stages of Knowledge discovery in database(KDD) , Setting up a KDD environment, Issues in Data Warehouse and Data Mining, Application of Data Warehouse and Data Mining	5
2	**Architecture:** DBMS vs. Data Warehouse, Data marts, Metadata, Multidimensional data model, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations, Data Warehouse Architecture, Distributed and Virtual Data Warehouse, Data Warehouse Manager, OLTP, OLAP, MOLAP, HOLAP, types of OLAP, servers	6
3	**Introduction:** Data Mining, Motivation, Challenges, Origins of Data Mining, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity, Exploring Data: Iris Data Set, Summary Statistics,	3

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Visualization, OLAP and Multi dimensional Data Analysis	
4	**Classification:** Basic Concepts and Preliminaries, Approach to Solving a Classification Problem, Decision Tree Induction, Model Over fitting, Evaluating Performance of Classifier **Alternative Techniques**: Rule-Based Classifier, Nearest- Neighbour Classifiers, Artificial Neural Network (ANN), Support Vector Machine (SVM), Ensemble Methods, Class Imbalance Problem, Multiclass Problem	6
5	**Association Analysis:** Basic Concepts and Problem Definition, Frequent Itemset Generation, Rule Generation, Representation of Frequent Itemsets, FP-Growth Algorithm, Evaluation of Association Patterns, Handling Categorical Attributes , Handling Continuous Attributes, Handling a Concept Hierarchy, Sequential Patterns, Subgraph Patterns	6
6	**Cluster Analysis:** Basic Concepts, Characteristics of Data, Clusters, Partitional Clustering, Agglomerative Hierarchical Clustering, Prototype-Based Clustering, Density-Based Clustering, Graph-Based Clustering, Cluster Evaluation **Anomaly Detection:** Preliminaries, Statistical Approaches, Proximity-Based Outlier Detection, Density-Based Outlier Detection, Clustering-Based Techniques	6
Total lectures		**32**

Suggested Text Book(s):

1. Data Mining Concepts and Techniques J. Han and M. Kamber Morgan Kaufmann, 2006, ISBN 1-55860-901-6
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7

Suggested Reference Book(s):

1. Mining Massive data sets Anand Rajaram, Jure Leskovec and Jeff Ullman Cambridge University Press
2. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
3. https://www.coursera.org/specializations/data-mining.
4. https://www.futurelearn.com/courses/data-mining-with-weka

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	1.8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

CO 2	3	3	3	3	3	3	2	3	3	1	1	3	**2.6**
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	**2.5**
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	**1.7**
CO 5	3	3	3	3	2	3	1	2	3	2	3	3	**2.6**
CO 6	3	2	1	2	2	1	2	2	2	1	1	2	**1.8**
Average	**3**	**2.3**	**2.2**	**2.3**	**2.2**	**2**	**1.5**	**2.2**	**2.3**	**1.5**	**1.8**	**2.5**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Foundations of Block Chain

Course Code: 19B1WCI839

Course Credit: 3-0-0

Course Pre-requisites (if any): Some programming experience (at least one year suggested). Potential students will need to pass a brief programming assessment for enrollment in the course.

Course Objectives:

S No	Course Outcomes (Block Chain Technologies) 18B1WCI836	Level of Attainment
CO-1	Explain how bitcoin works, from when a transaction is created to when it is considered part of the blockchain	Familiarity
CO-2	Thoroughly explain private and public keys as well as addresses and how exactly they are constructed and used	Familiarity
CO-3	Expose students to the different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading	Assessment
CO-4	Decompose a blockchain system's fundamental components, how they fit together and examine a modular blockchain system in more detail	Assessment
CO-5	Detailed understanding of naïve Attacks and Trustless Networks of block chain	Assessment
CO-6	Provide a thorough understanding of smart contracts, their technical capabilities, practical applications, limitations and security constraints they operate within	Usage
CO-7	Explain to students both fundamental and implied differences between Ethereum and Bitcoin protocol by covering historical, conceptual and architectural distinctions	Assessment

Detailed Course Contents:

Module	Contents	Lectures required
Module-1	**The story of a transaction** a) From Transactions to Blocks b) Blocks and Distributed Consensus c) Basic interaction with a Bitcoin node	2
Module-2	**Keys and Addresses** a) Basic cryptography b) From private keys to addresses	2
Module-3	**The Bitcoin Script language** a) Introduction to the Bitcoin Script language b) Script writing and execution c) Advanced scripting	8
	d) Tools and libraries to access Bitcoin's API and scripting capabilities **Blockchain deployment** a) Mining and forking	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

	b) Upgrading the network c) Related BIPs d) Segregated Witness (SegWit)	
Module-4	**Blockchain architectures** a) Abstract Architecture b) Ways to dive deeper c) Introduction to major blockchain platforms	**6**
Module-5	**Comparing Bitcoin and Ethereum** a) Historical comparison b) Conceptual distinction between a payment system and a decentralized applications platform *c)* Differences in their architectures from *security-first aspect to a rich feature set* d) Future roadmap for them, following their own paths with probable interconnections	**8**
Module-6	**Development environment** a) Multitude of clients in Ethereum b) Production and test networks in Ethereum *c) Public, private and development deployments* **Contract code walk-through** a) Demonstration of smart contract b) Introduction to Solidity c) Contract lifecycle	**8**
Module-7	**Solidity in depth** a) Building blocks b) Popular contracts already in deployment **Considerations for production deployment** a) Quality of decentralized applications b) Code patterns *c) Security* d) Other smart contract platforms e) Discussion of future prospects	**8**
	TOTAL LECTURES	**42**

Suggested Text Book(s):

- Mastering Bitcoin, Andreas Antonopoulos, O'Reilly Publishing, 2014, ISBN: 978-0691171692.
- Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto, Online 2009 https://bitcoin.org/bitcoin.pdf
- Vitalik Buterin, Ethereum White Paper, Online, 2017,https://github.com/ethereum/wiki/wiki/ White- Paper

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN
IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Suggested Reference Book(s):

- Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, A. Narayanan, J.
- Bonneau, E. Felten, A. Miller, S. Goldfeder, Princeton University Press, 2016, ISBN: 978-0691171692
- The Science of the Blockchain, Roger Wattenhofer, CreateSpace Independent Publishing Platform, 2016, ISBN: 978-1522751830
- Ethereum Programming, Alex Leverington, Packt Publishing Limited, 2017, ISBN: 978- 1786463715

Other useful resource(s):

- Bitcoin Protocol Specifications (https://en.bitcoin.it/wiki/Protocol_specification)
- Bitcoin transaction Scripting (https://en.bitcoin.it/wiki/Script)
- Majority is not Enough: Bitcoin Mining is Vulnerable (http://arxiv.org/abs/1311.0243)
- Two Bitcoins at the Price of One? Double-Spending Attacks on Fast Payments in Bitcoin (http://eprint.iacr.org/2012/248.pdf)
- Ethereum documentation (http://www.ethdocs.org/en/latest)
- Solidity documentation ((https://solidity.readthedocs.io/en/develop))
- https://sites.google.com/site/blockchaintutorial/blockchain-course-content

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) – 10 Quizzes (2) - 10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Weightage
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	83
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	86
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	81
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	83
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	81
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	86
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	81
Weightage	86	71	86	71	81	86	86	86	71	86	95	90	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Modern Analog and Digital Communication

COURSE CODE: 18B11EC413

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: None

Course Objectives:

1. Introduce students to basic concepts of analogue and digital communicationsystems.
2. To acquaint the students with various modulation and demodulation techniquesused for communication.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO1	To familiarize students with the fundamentals of analog and digital communication systems.	Familiarity
CO2	To familiarize students with basic techniques used for modulation and demodulation of signal.	Familiarity
CO3	Understanding of various approaches to convert analog signal to digital signal.	Assessment
CO4	Analyze mathematical background for communication signal analysis.	Assessment
CO5	To analyze performance of a communication system.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Review of fundamental concepts: Review of Fourier series and Fourier transforms, Power Spectral Density, review of probability and random processes, spectral analysis, Gaussian process, Gaussian and white noise characteristics.	4
2	Modulation techniques: Concept of modulation and demodulation, Continuous wave (CW) modulation: AM, DSB, SSB, and VSB modulation, Angle modulation - PM & FM wave equations; relationships between PM and FM. Narrow band FM. Spectra of AM and FM waves. AM and FM detectors. Phase Lock loop (PLL) and its application as FM demodulator, Discriminator, FM Pre-emphasis and De-emphasis, capture effect. Comparison of CW modulation systems. Receivers for CW modulation: Superheterodyne receivers	13
3	Pulse modulation: Sampling process, Pulse modulation: Pulse amplitude modulation (PAM); pulse width modulation (PWM); pulse position modulation (PPM), Quantization, Pulse code modulation (PCM), differential pulse code modulation (DPCM); delta modulation (DM). Noise consideration in PCM and DM. Line coding schemes, Comparison of RZ, NRZ, Polar, Unipolar, Manchester, and their spectral analysis.	7
4	Baseband Pulse Transmission: Baseband transmission, matched filter, probabilty of error of matched filter, Inter symbol Interference and Nyquist criterion, Eye-pattern, Signal to noise ratio.	5
5	Pass band Digital Modulation schemes: Amplitude shift keying (ASK), Phase shift keying (PSK), Frequency shift keying (FSK) and Quadrature amplitude modulation (QAM). Basics of CPFSK and MSK, Signal constellations, Probability of error analysis of digital modulation schemes. Comparison of bandwidth and bit rate of digital modulation schemes. Multiplexers, Timing and frequency synchronization: TDM, FDM, North American Digital Hierarchy, T1 carrier, carrier synchronizers, symbol synchronization, early late gate synchronizer	13
	Total lectures	42

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

1. Simon Haykin, "An introduction to analog and digital communications", 2nd Ed., John Wiley & Sons,2012
2. B.P.Lathi, "Modern Analog and Digital Communication Systems", 4th Ed., Oxford.,2017
3. Taub Schilling, "Principles of Communication Systems", 4th Ed., McGrawHill.,2007

Other useful resource(s):

1. https://nptel.ac.in/courses/117101051/ (Prof. Bikash Kumar Dey, IIT Bombay)
2. https://onlinecourses.nptel.ac.in/noc17_ec11/preview (Prof. Goutam Das, IIT Kharagpur)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Modern Analog and Digital Communication)	PO 1	PO 2	PO 3	PO 4	PO 5	PO-6	PO 7	PO 8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	1	2	2	2	1	1	1	1	2	1	2	1.58
CO2	2	3	2	2	2	1	1	1	1	2	1	2	1.67
CO3	3	3	3	2	2	2	2	1	2	2	1	1	2.00
CO4	2	2	3	3	2	1	1	2	1	2	1	2	1.83
CO5	3	3	3	2	3	1	1	1	1	2	2	2	2.00
Average	2.6	2.4	2.6	2.2	2.2	1.2	1.2	1.2	1.2	2	1.2	1.8	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Wireless and Data Communication

COURSE CODE: 18B11EC611

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand the fundamentals of wireless and data communication networks.
2. To allow the students to learn network architecture and protocols of trending wireless networks.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basics of wireless communication system and various wireless standards.	Familiarity
CO-2	Have the basic knowledge of computer networks and its applications in communication engineering.	Familiarity
CO-3	Understand the behavior of wireless channel.	Usage
CO-4	Have the knowledge of data sharing and their protocols.	Usage
CO-5	Brief the recent protocols and standards of various communication networks.	Assessment
CO-6	Get familiar with the recent wireless communication systems.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Review of Wireless Communication: Introduction to Wireless Communication, Basic building blocks of wireless system: source coding & channel coding, base band & band pass signal representation; 1G, 2G, 2.5G, 3G, 4G and 5G wireless standards and their Comparison; Multiple Access techniques: TDMA, FDMA, CDMA, OFDMA.	6
2	Wireless Channel: Linear Time Varying System; Path loss model; Multipath Propagation; Doppler Shift; Parameters of Wireless Multipath Channel; Small-scale and large-scale fading; Shadowing, Types of Fading: flat fading, frequency selective fading, slow fading and fast fading; Capacity of wireless channel: Capacity of AWGN, Flat Fading and Frequency Selective Channels.	10
3	Data Communication: OSI vs TCP/IP model; Wired vs Wireless; Circuit switching/ Packet switching; Flow control and error control; CRC; Connection oriented/connection less transmission; Bit stuffing.	7
4	MAC, Network and transport layer protocols: Dynamic multiple access methods: ALOHA, slotted ALOHA, CSMA/CD etc; Routing algorithms: DSDV, LSR, AODV; Broadcasting methods: flooding, spanning tree, multicasting; UDP, TCP, IP, IPv4, IPv6, QoS.	8
5	Wireless Networks: Introduction to WiFi; 802.11, 802.11a and 802.11 b Wireless LANs; Frame structure; Modes of operation; Data rates; Power management; Handoff strategies, Medium access control etc. Bluetooth networks: Piconet, scatternet, frame structure, data rates; synchronous and asynchronous services, power saving etc	8
6	Recent Trends: Introduction to WiMAX and ZigBee Networks; Software Defined Radio; UWB Radio; Wireless Adhoc Network and Mobile Portability; Security issues and challenges in a Wireless network.	3

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Total lectures	42

Suggested Text Book(s):

1. T.S. Rappaport, "Wireless Communication", 2nd Edition, Prentice Hall., 2010.
2. A. Tanenbaum, "Computer Networks", 5th Edition, Prentice Hall, 2011.
3. Bahrouz Forouzan, "Data communication & Networking," 5th Edition, McGraw Hill, 2017.

Suggested Reference Book(s):

1. William Stallings, "Data and Computer Communications," 10th Edition, Pearson.,2013.

Other useful resource(s):

Link to NPTEL course contents:

1. https://nptel.ac.in/courses/117102062/36
2. https://nptel.ac.in/courses/106105082/31

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Wireless and Data Communication)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	1	3	1	1	1	1	1	2	1	2	1.58
CO-2	3	3	1	3	2	1	1	3	1	2	1	2	1.92
CO-3	3	3	2	3	2	1	2	3	1	2	1	2	2
CO-4	3	3	3	3	2	1	2	3	1	2	1	2	2.17
CO-5	3	3	3	3	3	1	2	3	2	2	1	2	2.33
CO-6	3	3	3	3	3	1	3	3	3	2	3	2	2.67
Average	3	3	2.17	3	2.17	1	1.83	2.67	1.5	2	1.33	2	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Computer Aided Drug Design

COURSE CODE: 18B11BI612

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: None

Course Objectives:

1. To design potential lead molecules against any disease that may be explored further as a potential candidate for the drug development.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Feasibility study of a drug development project	Familiarity
CO-2	Design and optimize lead molecules against drug target, and using ligand-basedapproach	Usage
CO-3	Determination of pharmacophore from lead molecules and active sites and use ofpharmacophore for lead discovery	Usage
CO-4	Development of potential drug molecule and pharmacophore databases for virtualscreening	Assessment
CO-5	Use of molecular fragments for lead discovery and implementation of statisticalapproaches for lead molecule discovery	Usage
CO-6	Bioavailability prediction of a drug and working capability in drug designing softwarelike, Discovery Studio and molecular dynamics software like AMBER 8.0, On-line tools, etc.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Drug design: A billion dollar baby and drug design techniquesteam work, Economic factors involved in drug design, Irrational vs.	4
	rational approaches, Drug target identification & computer-aided drug design processes, Case study related to drug target identification (Viral Targets -HIV Example)	
2	**Computational Approaches to Drug Design:** Structure-based (receptor fitting)and ligand-based (receptor mapping) molecule design, lead molecules design in a research environment (crossing the barriers), tools used in both environments	3
3	**Receptor Fitting (Lead discovery& refinement)**: Utility, Binding-site predictions: Stereoelectronic factors, receptor flexibility, tight binding; Docking: Introduction, search algorithms, scoring (MM, Grid, etc.), validation of results, comparisons of search and scoring methods; Docking processes and analysis of results; *De novo* design, database searching & high throughput virtual screening(HTVS); and applications. Introductions to docking & molecular modeling packages (DS Studio; Schrodinger Inc, Ligbuilder, etc.)	9
4	**Receptor Fitting (Lead optimization)**: Molecular simulation methods used for binding and free energy calculation, Calculation on Free Energy Perturbation(FEP) of 1. Thermolysin with 2 ligands, Molecular mechanics Poisson-Boltzmann surface area methods: molecular basis of HIV protease drug	4

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	resistance	
5	**Receptor Mapping (Pharmacophore)**: The pharmacophore concept, Determination of pharmacophore from a set of active molecules, Design of pharmacophore using various algorithms, Creating pharmacophore model from active site, Practical utility (searching compound databases) and A case study of new lead design	5
6	**Chemoinformatics:** Introduction, representing 2D & 3D structures, 2D chemical database applications & molecular descriptors and their classifications, database searching and applications in CADD	4
7	**Receptor Mapping (Quantitative structure activity relationship (QSAR))**: QSAR methodology, biological and physicochemical parameters, feature selection(PLS, PCA, MLR, etc.), model building and validation, QSAR applications in drug design, Quantitative structure-property relationships (QSPR), CoMFA, 3D and nD-QSAR methods	6
8	**Fragment-based Lead Discovery**: Fragment and substructure discovery and evaluation, virtual fragment scanning (trends, applications and web-based tools) & capture methods for fragment-based discovery	4
9	**ADMET**: Oral bioavailability, drug half-life in the bloodstream, BBB permeability, toxicity, Lipinski rule of five, The impact of physiochemical properties on the control of drug-like properties.	4
Total Lectures		42

Suggested Text Book(s):

1. David C Young : Computational Drug Design (A guide for computational and medicinal chemists) Wiley & Sons, Inc., New Jersey, USA
2. Holtje H.-D, Sippl W., Rognan D. and FolkersG. : Molecular Modeling, Basic Principles and Applications Wiley-VCHGmbH& Co. KGaA
3. Leach AR : Molecular Modeling: Principles and Applications: Prentice Hall, Edinburg UK.
4. Zartler ER & Shapiro MJ : Fragment-based Drug Discovery (A practical approach), Wiley & Sons, Inc., West Sussex, UK Flower DR : Drug design: cutting edge approaches, RSC publication, Cambrige, UK

Suggested Reference Book(s):

1. Merz KM, D Ringe, : Drug Design: Structure and Ligand-based Approaches. Reynolds CH Cambridge University Press
2. Opera TI :Chemoinformatics in Drug Discovery, Wiley-VCH, GMBH
3. Hubbard RE : Structure-based drug discovery (An overview), RSC publication, Cambrige, UK

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
C06	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Modeling and Simulation Techniques

COURSE CODE: 18B11CI413

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 2-0-0

Pre-requisite: Discrete Mathematics, Algorithm, Software Engineering

Course Objectives:

1. Student will model real-world systems and implement the model as a computer program
2. Student will learn model design and development comparison to analytical models.
3. Student will learn important methods of computing and statistics.
4. Student will learn important techniques of real world project development and management.
5. Student will learn to evaluate the performance of real-world systems by analyzing the output of the model under various conditions..

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of computer simulation and modeling.	Familiarity
CO-2	To learn statistical methods of estimation and testing and other relevant concepts	Technical
CO-3	To explain the working and applications of different types of simulation such as Monte Carlo, VS. Discrete Event	Technical
CO-1	You will learn how to model a system and the execution of simulation tools.	Technical
CO-2	You will learn to analyze input data, its parameters, and the use of random number in a typical simulation study.	Technical
CO-3	Student will learn different techniques for the Verification and Validation of a simulation study	Technical

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Simulation and Modeling:** Simulation: Definition, Methods, Systems, Variability, Complexity, Advantages. Modelling: Definition, characteristics, description, categories.	5
2	**Statistical Concepts:** Hypothesis, Estimation, Statistical Significance, Error/Risks. Statistical tests, Bounds and Correlation. Input Data Modelling, Output Data Analysis.	5
3	**Discrete-Event Simulation, Monte Carlo Simulation:** Queuing System Model Components, Simulation Methodology, DES Example, Implementation, Arena Simulation. The Monte Carlo Method, Sensitivity Analysis	8
4	**Systems Modeling:** System Model Types, Modeling Methodologies and Tools, Analysis of Modeling and Simulation, Operation Research Methods, Coding the Model, Use of Pseudo Random Number Streams.	8
5	**Data Collection and Analysis :** Obtaining Data, Data Format, Representing Unpredictable Variability, Distributions, Bootstrapping,	8

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Fitting Statistical Distributions to Empirical Data	
6	**Verification, Validation, and Accreditation:** Definition and concepts, Difficulties, Confidence as Validity. Conceptual Model Validation, Data Validation, White-Box Validation, Black-Box Validation, Experimentation Validation, Solution Validation, Independent Verification and Validation	8
Total lectures		**42**

Suggested Text Book(s):

1. Modeling and Simulation: Exploring Dynamic System Behavior, Authors: Birta, Louis G., Arbez, Gilbert
2. Simulation (5th Edition) , Authors: Sheldon Ross.

Suggested Reference Book(s):

1. MODELING AND SIMULATION FUNDAMENTALS Theoretical Underpinnings and Practical Domains by John A. Sokolowski Catherine M. Banks.
2. Science in the Age of Computer Simulation by ERIC WINSBERG
3. Modeling and Simulation: The Computer Science of Illusion. By Raczynski, S..

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106104019/
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106104019/1
   ii. https://nptel.ac.in/courses/106104019/4
   iii. https://nptel.ac.in/courses/106104019/26
   iv. https://nptel.ac.in/courses/106104019/2Ev

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Data Simulation and Modeling Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	2	1	3	3	2	3	3	3	2.5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

CO-2	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-3	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-4	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-5	3	3	3	3	2	2	3	3	2	3	3	3	**2.8**
CO-6	3	3	3	1	2	3	3	3	3	3	3	3	**2.8**
Average	**3**	**3**	**3**	**2.3**	**2**	**2**	**3**	**3**	**2.2**	**3**	**3**	**3**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Operating System

COURSE CODE: 18B11CI411

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: C/C++

Course Objectives:

1. To learn the mechanisms of OS to handle processes and threads and their communication.
2. To learn the mechanisms involved in memory management in contemporary OS.
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
4. To know the components and management aspects of concurrency management.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	An appreciation of the role of an operating system.	Familiarity
CO-2	Create processes and threads.	Assessment
CO-3	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.	Assessment
CO-4	For a given specification of memory organization develop the techniques for optimally allocating memory to processes by Increasing memory utilization and for improving the access time	Assessment
CO-5	Design and implement file management system.	Assessment
CO-6	For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers. .	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	4
2	**Process:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.	4
3	**Process Scheduling:** Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, Priority, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF	4
4	**Inter-process Communication:** Critical Section, Race Conditions, Mutual	10

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Exclusion, Hardware Solution, Strict Alternation, Peterson"s Solution, Lamport"s Bakery Algorithm, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader"s & Writer Problem, Dinning Philosopher Problem etc.	
5	**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker"s algorithm, Deadlock detection and Recovery.	4
6	**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.	6
7	**Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	5
8	**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms. **File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. **Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.	5
Total lectures		**42**

Suggested Text Book(s):

1. "Operating System Concepts" 9th Edition by Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. "Operating Systems: Internals and Design Principles" 9th Edition, William Stallings, Pearson.

Suggested Reference Book(s):

1. "Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. "Operating Systems: A Modern Perspective" 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India.
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106108101//
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/106106144/
   ii. https://www.class-central.com/course/udacity-introduction-to-operating-systems-3419

Evaluation Scheme:

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Operating System)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Information Security

COURSE CODE: XXX
COURSE CREDITS: 2
CORE/ELECTIVE: Elective
: 2-0-0

Pre-requisite: None

Course Objectives:

1. Investigation of core security technologies and security policies to mitigate risks.
2. Gain an understanding of network perimeter security design principles
3. Gain an understanding of free/ commercial security tools and their applications and develop the security solution for a given application/scenario.
4. Ability to review procedures for installation, troubleshooting, and monitoring of network devices to maintain integrity, confidentiality, and availability of data and devices.
5. Knowledge of the technologies that underpin the deployment and maintenance of a secure network.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understand the need for security	Familiarity
CO-2	Analysis of security algorithms	Assessment
CO-3	Demonstrate familiarity with major security algorithms and data structure.	Assessment
CO-4	Apply important security algorithmic design paradigms and methods of analysis.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Symmetric Encryption** Shift Cipher, Substitution Cipher, Vigen`ere Cipher, A Permutation Cipher Introduction To Symmetric Ciphers, Stream Cipher Basics, The Lorenz Cipher, Linear Feedback Shift Registers, Combining LFSRs, RC4	5
2	Introduction To Block Ciphers, Feistel Ciphers and DES, Rijndael, Modes of Operation Key Management, Secret Key Distribution, Formal Approaches to Protocol Checking Hash Functions, Designing Hash Functions, Message Authentication Codes	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

3	**Public Key Encryption and Signatures** Public Key Cryptography Candidate One-way Functions, RSA, ElGamal Encryption, Rabin Encryption, Paillier Encryption Diffie–Hellman Key Exchange, Digital Signature Schemes, The Use of Hash Functions In Signature Schemes, The Digital Signature Algorithm, Schnorr Signatures, Nyberg–Rueppel Signatures	5
4	**Attacks on Public-Key Schemes** Wiener's Attack on RSA, Lattices and Lattice Reduction, Lattice-Based Attacks on RSA, Partial Key Exposure Attacks	5
5	**Provable Security:** Security of Signature Algorithms, Security of Encryption Algorithms, Hybrid Ciphers, Signature Schemes, Encryption Algorithms	4
6	**Advanced Protocols:** Access Structures, General Secret Sharing, Reed–Solomon Codes, Shamir Secret Sharing, Commitment Schemes, Oblivious Transfer, Showing a Graph Isomorphism in Zero-Knowledge, Zero-Knowledge and NP, Sigma Protocols	4
	Total Lecture Hours	28

Suggested Text Book(s):

- Cryptography: An Introduction, Nigel Smart
- Cryptography and Network Security: Principles and Practice William Stallings

Suggested Reference Book(s):

- A.J. Menezes, P. van Oorschot, and S.A. Vanstone. The Handbook of Applied Cryptography.

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Information Security)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

From Graph to Knowledge Graph

COURSE CODE: XXX **COURSE CREDITS:** 2 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 2-0-0
Pre-requisite: Basic programming skills

Course Objectives:

1. You will learn graph representations.
2. Understand the entire process of how to design, construct, and query a knowledge graph to solve real-world problems.
3. Understand how to apply the tools and infrastructure to build and query knowledge graphs.
4. Use knowledge graphs in modern search applications.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Learn graph representations	Familiarity
CO-2	Utilize fundamentals to build knowledge graphs	Assessment
CO-3	Understand the algorithms and techniques for crawling web sites, structured data extraction, and information extraction from unstructured text.	Assessment
CO-4	Understand how to apply the tools and infrastructure to build and query knowledge graphs.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	Introduction and Overview Introduction to Graphs, Introduction to Knowledge graphs	4
2	Graph Properties and Applications: Graph basics, Graph Applications	4
3	Graph Representation Learning Embeddings and Graph Embeddings	4
4	Knowledge Graph (KG) - Fundamentals and Construction. KG Fundamentals How to Build a Knowledge Graph	5
5	Knowledge Graph (KG) - Inference and Applications KG Inference. How to Use a Knowledge Graph Why We Need Knowledge Graphs: Applications KG Applications	6
6	Knowledge graph analytics	5
	Total Lecture Hours	**28**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

- Fensel, Dieter (et al.), "Knowledge Graphs Methodology, Tools and Selected Use Cases", Springer, 2020.
- Qi, G. et. al, "Knowledge Graph", Springer, 2020, ISBN 978-981-10-8177-4

Suggested Reference Book(s):

- Jeff Z. Pan, Guido Vetere, Jose Manuel Gomez-Perez, Honghan Wu, " Exploiting Linked Data and Knowledge Graphs in Large Organisations", Springer International Publishing, Print ISBN 978-3-319-45652-2, DOI https://doi.org/10.1007/978-3-319- 45654-6
- Mayank Kejriwal, "Domain-Specific Knowledge Graph Construction", Springer, DOI: 10.1007/978-3-030-12375-8

Other useful resources (s):

- Journal, "Knowledge-Based Systems", Springer

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (From Graph to Knowledge Graph)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Software Engineering

COURSE CODE: 18B1WCI639

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Computer Programming, Data Structures and Computer Architecture.

Course Objective:

1. Be successful professionals in the field with solid fundamental knowledge of software engineering.
2. Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.
3. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To learn common lifecycle processes and requirement engineering concept	Familiarity
CO-2	To Design a solution to a given problem and implement the design in a programming language.	Assessment
CO-3	Understand Software Project Management	Assessment
CO-4	To learn the concept of recognizing, defining and estimating software attributes	Assessment

Course Contents:

Unit	Contents	Lectures required
1	• Introduction to software process models (e.g., waterfall, incremental, agile) • Activities within software lifecycles • Evaluation of software process models • Software quality concepts • Process improvement • Software process capability maturity models • Software process measurements	3
2	• Team participation • Effort Estimation • The role of risk in the lifecycle • Team Management • Project Management(Scheduling and tracking) • Software measurement and estimation techniques • Software quality assurance and the role of measurements	3
3	• Describing functional requirements using, for example, use cases or users stories • Properties of requirements including consistency, validity,	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	completeness, and feasibility • Software requirements elicitation • Describing system data using, for example, class diagrams or entity-relationship diagrams • Non-functional requirements and their relationship to software quality (cross-reference IAS/Secure • Software Engineering) • Evaluation and use of requirements specifications • Requirements analysis modelling techniques • Acceptability of certainty / uncertainty considerations regarding software / system behaviour	
4	• System design principles: levels of abstraction (architectural design and detailed design), separation ofconcerns, information hiding, coupling and cohesion, re-use of standard structures • Design Paradigms such as structured design (top-down functional decomposition), object-oriented analysisand design, event driven design, component-level design, data-structured centered, aspect oriented,function oriented, service oriented • Structural and behavioural models of software designs • Design patterns • Relationships between requirements and designs: transformation of models, design of contracts, invariants • Software architecture concepts and standard architectures (e.g. client-server, n-layer, transform centered, pipes-and-filters) • Refactoring designs using design patterns • The use of components in design: component selection, design, adaptation and assembly of components, components and patterns, components and objects (for example, building a GUI using a standard widget set) • Internal design qualities, and models for them: efficiency and performance, redundancy and faulttolerance, traceability of requirements • External design qualities, and models for them: functionality, reliability, performance and efficiency, usability, maintainability, portability • Measurement and analysis of design quality • Tradeoffs between different aspects of quality • Application frameworks • Middleware: the object-oriented paradigm within middleware, object request brokers and marshalling, transaction processing monitors, workflow systems	6
5	• Coding practices: techniques, idioms/patterns, mechanisms for building quality programs (cross-referenceIAS/Defensive Programming; SDF/Development Methods) • Coding standards • Integration strategies • Potential security problems in programs • Buffer and other types of overflows • Race conditions • Improper initialization, including choice of privileges • Checking input	6
6	• Identification related attributes • Size related attributes • Function point attribute estimation	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	• Feature point estimation • Software quality attributes • Complexity related attributes • Design & Development related attributes	
7	• Software development in the context of large, pre-existing code bases • Software change • Concerns and concern location • Refactoring • Software evolution • Characteristics of maintainable software • Reengineering systems • Software reuse • Software Maintenance & Reverse Engineering	6
8	• Software reliability engineering concepts • Software reliability, system reliability and failure behavior (cross-reference SF/Reliability Through Redundancy) • Fault lifecycle concepts and techniques • Software reliability models • Software fault tolerance techniques and models • Software reliability engineering practices • Measurement-based analysis of software reliability	6
Total lectures		**42**

Suggested Text Book(s):

1. R.S. Pressman, "Software Engineering: A Practitioner's Approach", 7Edition, McGraw Hill, 2010
2. Sommerville, "Introduction to Software Engineering", 8Edition, Addison-Wesley, 2007

Suggested Reference Book(s):

1. Ghezzi, Jazayeri and Mandrioli, "Fundamentals of Software Engineering", 2Edition, Prentice-Hall, 2003
2. Peters and Pedrycz, "Software Engineering: An Engineering Approach, John Wiley, 2004
3. Len Bass, "Software Architecture in Practice", 2Edn. Addison Wesley, 2003
4. Allamaraju, "Professional Java Server Programming", Apress, 2004
5. Eric Gamma, "Design Patterns: Elements of Reusable OO Software", 1994
6. A concise introduction to software Engineering, Pankaj Jalote, Springer
7. Software Engineering, Nasib Singh Gill, Khanna Publishing House
8. Software Engineering, K.K. Aggarwal & Yogesh Singh, New Age International

Other useful resource(s):

1. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://www.cs.cornell.edu/Courses/cs5150/2013fa/
3. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j- software-engineering-concepts-fall-2005/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • AGO
IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Mining and Data Warehousing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO 1	3	2	1	2	2	2	2	2	2	1	1	2	3
CO 2	3	3	3	3	3	3	2	3	3	1	1	3	2.7
CO 3	3	3	3	3	2	2	1	2	3	2	3	3	2.2
CO 4	3	1	2	1	2	1	1	2	1	2	2	2	1.7
Average	2.5	2.5	3	3	2.3	2.3	2.5	2.3	2.3	1.7	1.5	1.5	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • HP

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Statistics and Exploratory Data Analytics

COURSE CODE: XXX **COURSE CREDITS:** 2 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 2-0-0
Pre-requisite: None

Course Objectives:

1. Learn the basic concept of statistics and exploratory data analysis.
2. Learn graphical and modeling techniques for exploring data.
3. Learn Data Transformation and dimensionality reduction of data.
4. Learn data clustering and scatter plots.
5. Apply exploratory data analysis techniques to visualized data.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Analyze the concept of statistics and exploratory data analysis.	Familiarity
CO-2	Graphical and modeling techniques for exploring data.	Assessment
CO-3	Implement data transformation, dimensionality reduction	Assessment
CO-4	Apply data clustering and visualized exploratory data through various plots and graphs.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Concept of statistics and exploratory data analysis:** Introduction of data and its types (categorical and quantitative), Central Tendency: mean, median, mode, variance, standard deviation, skewness, kurtosis, exploratory data analysis, and its types, data dimensionality.	5
2	**Graphical and modeling techniques for exploratory data:** Box Plot, Histogram, Multi-Vari Chart, Run Chart, Pareto Chart, Scatter Plot, Stem-and-leaf plot.	5
3	**Data transformation, dimensionality reduction**: Power transformation, standardization, multidimensional scaling, principal component analysis, linear or non-linear dimensionality reduction.	7
4	**Data Clustering Techniques:** Data clustering, Hierarchal methods, optimization method, k-means, and model-based clustering.	5
5	**Smoothing scatter plots and graphical methods for EDA:** Bivariate distribution smooths, curve fitting toolbox, Dendrogram, treemaps, rectangle plots.	6
	Total Lecture Hours	28

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Suggested Text Book(s):

- Martinez, W. L.; Martinez, A. R. & Solka, J. (2010). *Exploratory Data Analysis with MATLAB, second edition*. Chapman & Hall/CRC.
- Hoaglin, D C; Mosteller, F & Tukey, John Wilder (Eds) (1983). *Understanding Robust and Exploratory Data Analysis*.
- Andrienko, N & Andrienko, G (2005) *Exploratory Analysis of Spatial and Temporal Data. A Systematic Approach*

Suggested Reference Book(s):

- Tukey, John Wilder (1977). *Exploratory Data Analysis*. Addison-Wesley

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Statistics and Exploratory Data Analytics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	1.9

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Data Structure and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisites: C/C++

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures
5. Introduce students to data abstraction and fundamental data structures.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	7
2	**Stacks:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	5
3	**Queues:** ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	5
4	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	8
5	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	6
6	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	6
7	**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	5
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.
3. "Data structures and Algorithms Made Easy" 5th edition by Narasimha Karumanchi, Career monk publications
4. "Data Structure and Algorithms in C" 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106102064/
2. Link to topics related to course:
   a. https://onlinecourses.nptel.ac.in/noc18_cs25/preview

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

b. https://nptel.ac.in/courses/106103069/

c. http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	2.4
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	2.5
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	2.4
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	2.6
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	2.5
Average	3	3	3	2	2.7	2.8	2	2	2.5	3	1	3	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Machine learning for Bioinformatics

COURSE CODE:18B11BI611

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: Molecular biology, Python

Course Objectives:

1. Learn what is machine learning
2. Learn algorithms used in machine learning.
3. Learn how to implement machine learning for biological problems.
4. Apply machine learning to practical projects.
5. Use machine learning and data mining in one project.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Different types of machine learning and its utility in bioinformatics	Familiarity
CO-2	Application of Hidden Markov Model and Artificial neural networks to different types of bioinformatics data	Assessment
CO-3	Determination of Bayesian Network (BN) from expression data.	Assessment
CO-4	Application of symbolic machine learning (SML) methods to predict cleavage site of HIV- protease from training data of positive and negative cases.	Assessment
CO-5	Optimization of weights in a supervised and unsupervised neural network, and application of supervised learning to predict sub- cellular localization of a protein.	Assessment
CO-6	Application of stochastic context-free grammar (SCFG) to predict RNA secondary structure.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Overview of intelligent systems and machine learning	1
2	**Hidden Markov Model (HMM):** Viterbi algorithm, Forward algorithm,	10
	Backward algorithm, Profile-HMM, Baum-Welch algorithm to optimize HMM-profile, Multiple alignment and database searching using profile- HMM	
3	**Symbolic Machine Learning:** Nearest neighbour approach to predict secondary structure, Decision tree methods, Identification tree methods	6
4	**Bayesian Network (BN):**Calculation of statistical significance by using Bayesian methods, Factorization and Markov blanket rule, d-separation, Equivalence classes, Learning of Bayesian network, Learning of Gaussian network	9
5	**Artificial Intelligence (AI):**Search strategies, logic, deduction, and pathways comparison	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Approved in Academic Council held on 25.10.2018

6	**Artificial Neural Network (ANN):**Basics and introduction to terminologies, Supervised and non-supervised learning, Feed forward back propagation error method, Application of ANN methods: Protein sub-cellular localization and secondary structure prediction	7
7	**Stochastic Context Free Grammar (SCFG):**Transformational grammar, Parsing, Chomsky hierarchy (regular, context-free, context-sensitive, and unrestricted grammar), Automata, Context-free grammar, Application of SCFG for prediction of secondary structure of RNA	5
Total Lectures		42

Suggested Text Book(s):

a. R. Durbin, S. Eddy, A. Krogh, and G. Mitchison (1998), Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press
b. Edward Keedwell and Ajit Narayanan (2005), Intelligent Bioinformatics: The Application of Artificial Intelligence Techniques to Bioinformatics Problems, Wiley
c. P Baldiand S Brunak, BIOINFORMATICS: The Machine Learning Approach

Suggested Reference Book(s):

1. Olson et al., 2018. Data-driven advice for applying machine learning to bioinformatics problems
2. Husmeier D, Dybowski R, and Roberts S (2005), Probabilistic Modeling in Bioinformatics and Medical Informatics, Springer
3. Nat Cell Biol. 2001 Aug;3(8):E190-5. Review. PubMed PMID: 11483980
4. Kim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE, Seidman JG. Polony multiplex analysis of gene expression (PMAGE) in mouse hypertrophic cardiomyopathy. Science. 2007 Jun 8;316(5830):1481-4. PubMed PMID: 17556586
5. MacBeath G, Schreiber SL. Printing proteins as microarrays for high-throughput function determination. Science. 2000 Sep 8;289(5485):1760-3. PubMed PMID: 10976071.
6. Shankar J, Wu TD, Clemons KV, Monteiro JP, Mirels LF, et al. (2011) Influence of 17b-Estradiol on Gene Expression of Paracoccidioides during Mycelia-to- Yeast Transition. PLoS ONE 6(12): e28402. doi:10.1371/journal.pone.0028402
7. Mary V. Relling, William E. Evans Nature. Author manuscript; available in PMC 2016 Jan 13.
8. Published in final edited form as: Nature. 2015 Oct 15; 526(7573): 343–350. doi: 10.1038/nature15817

Other useful resource(s):

1.Link to NPTEL course contents:https://nptel.ac.in/courses/106104019/

2.Link to topics related tocourse:

i. https://www.advancedsciencenews.com/machine-learning-for-bioinformatics-and-neuroimaging/
ii. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm
iii. https://www.analyticsvidhya.com/blog/2017/09/understaing-support-vector-machine-example-code/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY * WAKNAGHAT * IQAC

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Machine learning for Bioinformatics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	**1.92**
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	**1.75**
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	**1.73**
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	**1.73**
CO-5	2	2	2	2	2	1	1	1	2	-	-	2	**1.7**
CO-6	2	2	2	2	2	1	1	1	-	-	-	2	**1.67**
Average	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**1.16**	**1.16**	**1.33**	**2.0**	**2.0**	**1.33**	**2.0**	

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

Machine Learning for Data Analysis

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Introduction to Machine Learning

(20B1WEC531) Course Objectives:

1. To provide a broad survey of approaches and techniques in machine learning;
2. To develop the design and programming skills that will help you to build intelligent, adaptive artifacts.
3. To develop the basic skills necessary to pursue research in machine learning.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic theory underlying machine learning.	Familiarity
CO-2	Understand a range of machine learning algorithms along with their strengths and weaknesses.	Usage
CO-3	Apply machine learning algorithms to solve problems of moderate complexity.	Assessment
CO-4	Formulate machine learning problems corresponding to different applications.	Assessment
CO-5	Read current research papers and understand the issues raised by current research.	Usage

Unit	Contents	Lectures required
1	Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.	3
2	Data Exploration and Pre-processing: Data objects and attributes; Statistical measures, Visualization, Data cleaning and integration	4
3	Decision Tree based Learning: Decision tree induction, Attribute selection and tree pruning.	5
4	Support Vector Machines: Maximum margin linear separators, Quadractic programming solution to finding maximum margin separators, Kernels for learning non-linear functions.	5
5	Dimensionality Reduction: Discriminant analysis; Principal component analysis, Independent component analysis; Transform Domain and statistical feature extraction and reduction.	7
6	Clustering and Unsupervised Learning: Learning from unclassified data,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Clustering, Hierarchical Aglomerative Clustering, k-means clustering, Density based clustering.	
7	Artificial Neural Networks: Single layer neural network, Multilayer Perceptron, Back Propagation learning, Functional link artificial neural network, Radial basis function network, Recurrent neural networks, Convolution neural network.	10
Total lectures		42

Suggested Text Book(s):

1. J. Watt, R. Borhani and A. K. Katsaggelos: Machine Learning Refined: Foundations, Algorithms and Applications, Cambridge University Press, 1st ed., 2016.
2. C. Bishop: Pattern Recognition and Machine Learning, Springer, 1st ed., 2006.
3. J. Han, M. Kamber, J. Pei: Data Mining: Concepts and Techniques, Elsevier Amsterdam, 3rd ed., 2011

Suggested Reference Book(s):

1. T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2013.
2. H. Simon: Neural Networks and Learning Machines, Prentice Hall, 3rd ed., 2009.

Other useful resource(s):

1. H. Daume: A course in Machine Leaning, 2015. http://ciml.info/
2. Link to NPTEL course contents: Introduction to Machine Learning https://onlinecourses.nptel.ac.in/noc17_cs26/preview
3. Link to MITOPENCOURESEWARE: Machine Learning

https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (3) - 10 Quizzes (3) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Machine Learning and Data Analytics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	2	2	2	1	1	2	3	3	2.17
CO-2	3	3	3	2	3	2	2	1	1	2	3	3	2.33
CO-3	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO-4	3	3	3	3	3	3	3	1	3	3	3	3	2.83
CO-5	3	3	3	3	3	3	3	1	3	3	3	3	2.83
Average	3.00	3.00	2.80	2.60	2.80	2.60	2.60	1.00	2.20	2.60	3.00	3.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Advanced Algorithms

COURSE CODE: 18B1WCI743

COURSE CREDIT: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Analysis of Data Structures and Algorithms (this pre-requisite will not be waived). You are also expected to have the mathematical maturity to write formal proofs and algorithms.

Course Objectives:

1. Learn to analyze algorithms for Time and Space Complexity
2. Learn asymptotic notations for performance analysis of algorithms.
3. Learn various computing algorithms and data structure used in solving complex problems.
4. Apply important algorithmic design paradigms and method of analysis.
5. Synthesize efficient algorithm design in common engineering design situations.

Course outcomes:

S.No.	Course outcomes	Level of Attainment
CO-1	Analyze the asymptotic performance of algorithms.	Familiarity
CO-2	Write rigorous correction proof s of algorithms.	Assessment
CO-3	Demonstrate a familiarity with major algorithms and data structure.	Assessment
CO-4	Apply important algorithmic design paradigms and method of analysis.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Review of Analysis Techniques:** Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate,Accounting and Potential Methods.	8
2	**Graph Algorithms:** Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.	8
3	**Polynomials and the FFT:** Representation of polynomials;The DFT and FFT; Efficient implementation of FFT.	6
4	**Number -Theoretic Algorithms:** Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing: Integer factorization	6
5	**String-Matching Algorithms:** Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms.	8

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6	**Probabilistic and Randomized Algorithms:** Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms; Probabilistic numeric algorithms.	6
Total lectures		**42**

Suggested Text Book(s):

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.
3. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007

Suggested Reference Book(s):

1. S. Muthukrishnan, "Data streams: Algorithms and applications", Foundations and Trends in Theoretical Computer Science, Volume 1, issue 2, 2005.
2. Bach, E., and J. Shallit. Algorithmic Number Theory. Vol. 1. Cambridge, MA: MIT Press, August 26, 1996. ISBN: 9780262024051.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/106104019/
2. Link to topics related to course:
   a. https://nptel.ac.in/courses/106104019/1
   b. https://nptel.ac.in/courses/106104019/4
   c. https://nptel.ac.in/courses/106104019/26
   d. https://nptel.ac.in/courses/106104019/27

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Advanced Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.3	1.5	2	

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Advanced Algorithms Lab

COURSE CODE: 18B1WCI773

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisites: None

Course Objectives:

1. Learn to analyze algorithms for Time and Space Complexity
2. Learn asymptotic notations for performance analysis of algorithms.
3. Learn various computing algorithms and data structure used in solving complex problems.
4. Apply important algorithmic design paradigms and method of analysis.
5. Synthesize efficient algorithm design in common engineering design situations.
6. Design Bellman-Ford algorithm and determine its performance.
7. Design a Miller Rabin algorithm and Monte Carlo algorithm to test the primality of a given integer and determine its performance.
8. Design a string matching problems.

Course outcomes:

S.NO	Course outcomes	Level of Attainment
CO-1	Analyze the asymptotic performance of algorithms.	Familiarity
CO-2	Write rigorous correction proof s of algorithms.	Assessment
CO-3	Demonstrate a familiarity with major algorithms and data structure.	Assessment
CO-4	Apply important algorithmic design paradigms and method of analysis.	Usage

List of Experiments:

S.No	Description	Hours
1	Design, develop a program to implement the Bellman-Ford algorithm and determine its performance.	4
2	Design, develop a program to implement a Miller Rabin algorithm to test the primality of a given integer and determine its performance.	4
3	Design, develop a program to implement a Monte Carlo algorithm to test the primality of a given integer and determine its performance.	4
4	Design, develop a program to solve the string matching problem using naïve approach and the KMP algorithm and compare their performances.	4
5	Design, develop a program to solve string matching problem using Finite Automata and determine its performance.	6
6	Design, develop and write program to solve string matching problem using Robin Karp algorithm and determine its performance.	6
Total Lab hours		**28**

Suggested Books/Resources:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd
2. Edition, Prentice-Hall of India, 2010.
3. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.
4. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5. Edition, Universities press, 2007
6. S. Muthukrishnan, "Data streams: Algorithms and applications", Foundations and Trends in Theoretical Computer Science, Volume 1, issue 2, 2005.
7. Bach, E., and J. Shallit. Algorithmic Number Theory. Vol. 1. Cambridge, MA: MIT Press, August 26, 1996. ISBN: 9780262024051.
8. Link to topics related to course:
   i. https://tejaswinihbhat.blogspot.com/2016/07/program-1-bellman-ford-algorithm-design.html
   ii. https://www.sanfoundry.com/c-program-implement-rabin-miller-primality-test-check-number-prime/
   iii. https://www.cs.bu.edu/fac/lnd/toc/z/node21.html
   iv. http://cs.indstate.edu/~kmandumula/abstract.pdf

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	**2**	**2.5**	**2.5**	**2.5**	**2.5**	**1**	**1**	**1**	**2**	**2.3**	**1.5**	**2**	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Introduction to Statistical Learning

COURSE CODE:19B1WCI740

COURSE CREDITS: 3

CORE/ELECTIVE: OPEN ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basics of programming and mathematics.

Course Objectives:

1. To understand the fundamentals of statistical learning and, analyzing regression and classification.
2. To understand and analyze pre-processing data and model selection.
3. To understand and analyze non-linear and tree based regression.
4. To understand and analyze Support Vector Classifier and Machines, and unsupervised learning.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding statistical learning and, analyzing regression and classification.	Familiarity and usage
CO-2	Analyzing resampling, model selection and regularization.	Usage
CO-3	Analyzing non-linear and tree based regression.	Usage
CO-4	Analyzing Support Vector Machines and unsupervised learning	Usage

Unit	Contents	Lectures required
1	**Introduction to statistical learning:**Prediction accuracy, Model interpretability, Supervised and Unsupervised learning, Assessing model accuracy	7
2	**Regression and Classification:** Regression- Linear, MultiLinear and kNN, Classification-Logistic regression, Linear and quadratic discriminant analysis, and kNN	8
3	**Resampling, Model Selection and Regularization:** Cross-validation, the bootstrap, Subset selection, Shrinkage methods, Dimension reduction methods, considerations in high dimension	9
4	**Non-linear Regression:**Polynomial regression, Step functions, Regression splines, Smoothing splines, Local regression, Generalized additive methods, **Tree Based Regression:** the basics of decision trees, Bagging, Random forest and Boosting,	9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Support Vector Machines:** Maximal margin classifier, Support Vector Classifier and Support Vector Machines, **Unsupervised Learning:** The challenges, Principal Component Analysis, Clustering methods	9
Total lectures		**30**

Course Contents:

SuggSuggested Text Book(s):

1. Gareth James, Daneila Witten, Trevor Hastie and Robert Tibshirani, "An Introduction to Statistical Learning with Applications in R", Springer, 8th Printing, 2017.

Suggested Reference Book(s):

1. Hastie, Tibshirani and Friedman, "The elements of statistical learning", 2nd edition, Springer, 2009.
2. Sanjeev Kulkarni and Gilbert Harman, " An elementary introduction to statistical learning theory, Wiley, 2011.
3. Fernandes de Mello, Rodrigo et. al., " Machine Learning – A practical approach on the statistical learning theory", Springer, 2018.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT IQAC

Course Outcomes (COs) contribution to the Programmed Outcomes(POs)

Course outcomes (Statistical Learning with Applications in R)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	1	1	2	1	3	2	2.33
CO-2	3	3	3	3	3	3	2	1	2	1	3	2	2.42
CO-3	3	3	3	3	3	3	2	1	2	1	3	2	1.42
CO-4	3	3	3	3	3	3	1	1	2	1	3	2	2.33
Average	3	3	3	3	3	3	1.5	1	3	1	3	3	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Introduction to Statistical Learning

COURSE CODE:19B1WCI740

COURSE CREDITS: 3

CORE/ELECTIVE: OPEN ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basics of programming and mathematics.

Course Objectives:

1. To understand the fundamentals of statistical learning and, analyzing regression and classification.
2. To understand and analyze pre-processing data and model selection.
3. To understand and analyze non-linear and tree based regression.
4. To understand and analyze Support Vector Classifier and Machines, and unsupervised learning.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding statistical learning and, analyzing regression and classification.	Familiarity and usage
CO-2	Analyzing resampling, model selection and regularization.	Usage
CO-3	Analyzing non-linear and tree based regression.	Usage
CO-4	Analyzing Support Vector Machines and unsupervised learning	Usage

Unit	Contents	Lectures required
1	**Introduction to statistical learning:**Prediction accuracy, Model interpretability, Supervised and Unsupervised learning, Assessing model accuracy	7
2	**Regression and Classification:** Regression- Linear, MultiLinear and kNN, Classification-Logistic regression, Linear and quadratic discriminant analysis, and kNN	8
3	**Resampling, Model Selection and Regularization:** Cross-validation, the bootstrap, Subset selection, Shrinkage methods, Dimension reduction methods, considerations in high dimension	9
4	**Non-linear Regression:**Polynomial regression, Step functions, Regression splines, Smoothing splines, Local regression, Generalized additive methods, **Tree Based Regression:** the basics of decision trees, Bagging, Random forest and Boosting,	9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	**Support Vector Machines:** Maximal margin classifier, Support Vector Classifier and Support Vector Machines, **Unsupervised Learning:** The challenges, Principal Component Analysis, Clustering methods	9
Total lectures		**30**

Course Contents:

SuggSuggested Text Book(s):

1. Gareth James, Daneila Witten, Trevor Hastie and Robert Tibshirani, "An Introduction to Statistical Learning with Applications in R", Springer, 8th Printing, 2017.

Suggested Reference Book(s):

1. Hastie, Tibshirani and Friedman, "The elements of statistical learning", 2nd edition, Springer, 2009.
2. Sanjeev Kulkarni and Gilbert Harman, " An elementary introduction to statistical learning theory, Wiley, 2011.
3. Fernandes de Mello, Rodrigo et. al., " Machine Learning – A practical approach on the statistical learning theory", Springer, 2018.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programmed Outcomes(POs)

Course outcomes (Statistical Learning with Applications in R)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	1	1	2	1	3	2	2.33
CO-2	3	3	3	3	3	3	2	1	2	1	3	2	2.42
CO-3	3	3	3	3	3	3	2	1	2	1	3	2	1.42
CO-4	3	3	3	3	3	3	1	1	2	1	3	2	2.33
Average	3	3	3	3	3	3	1.5	1	3	1	3	3	

Graduate Attributes/Program Outcomes	
PO-1	Engineering knowledge
PO-2	Problem analysis:
PO-3	Design/development of solutions:
PO-4	Conduct investigations of complex problems:
PO-5	Modern tool usage:
PO-6	The engineer and society:
PO-7	Environment and sustainability:
PO-8	Ethics:
PO-9	Individual and team work:
PO-10	Communication:
PO-11	Project management and finance:
PO-12	Life-long learning:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Artificial Intelligence

COURSE CODE: 18B1WCI742

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Data Structure, Discrete Structure

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction:** Intelligence, Definitions of Intelligent Agents **Single-Agent Search:** Breadth-first, Depth-first and Iterative Deepening Search, Heuristic Search (A* search), Stochastic Local Search (Simulated Annealing, Genetic algorithms)	7
2	**Adversarial Search:** Minimax Search, Alpha-beta pruning, Stochastic Games and Expectiminimax **Knowledge Representation and Logic:** Propositional Logic, Propositional Inference , First-Order Logic, Propositional Inference (Forward chaining, Backward chaining)	7
3	**Reasoning Under Uncertainty:** Probability Bayes Rule , Bayesian Networks, Bayesian Inference	7
4	**Machine Learning**: Definition and examples of broad variety of machine learning tasks, including classification, Inductive learning, Simple statistical-based learning, such as Naive Bayesian Classifier, decision trees, The over-fitting problem, Measuring classifier accuracy	11
Total lectures		32

Suggested Text Book(s):

1. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
2. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • AGO
IQAC

Suggested Reference Book(s):

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Machine Learning by Tom M. Mitchell
3. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb

Other useful resource(s):

1. Link to NPTEL course contents:
   i. https://nptel.ac.in/courses/106105077/
   ii. https://nptel.ac.in/courses/106105079/
2. Link to topics related to course:
   i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   ii. https://ai.google/education/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Artificial Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	2	1	2	1	2	2	2	1.9
CO-2	3	3	3	1	3	2	1	2	1	2	3	2	2.2
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Weightage	3	3	3	2.2	2	1.4	1.6	2	1.6	2	2.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 28 July 2021

IQAC

Artificial Intelligence Lab

COURSE CODE: 18B1WCI772

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Describe introductory techniques in Artificial Intelligence
2. Heuristic search and adversarial search, Logic for knowledge representation and reasoning
3. Reasoning under uncertainty
4. Machine Learning
5. Apply introductory techniques in Artificial Intelligence to solve realistic problems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Determine the characteristics of a given problem that an intelligent system must solve.	Familiarity
CO-2	Apply Bayes' rule to determine the probability of a hypothesis given evidence.	Assessment
CO-3	Identify examples of knowledge representations for reasoning under uncertainty.	Assessment
CO-4	List the differences among the three main styles of learning: supervised, reinforcement, and unsupervised.	Assessment
CO-5	Identify examples of classification tasks, including the available input features and output to be predicted.	Assessment

List of Experiments:

S.No	Description	Hours
1	Implementation of DFS and BFS Searching Algorithms	2
2	Implementation of A* Algorithm	2
3	Study of Prolog Language	2
4	Write simple fact for the statements using PROLOG.	2
5	Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing	2
6	WAP in turbo prolog for medical diagnosis and show that advantage and disadvantage of green and red cuts.	2
7	Write a program to solve the Monkey Banana problem	2
8	Study of LISP Language	2
9	Write a program to solve water jug problem using LISP	2
10	Consider House-votes dataset provided in lab. The task is to predict whether the voter is a republican or a democrat based on their votes using Naive Bayes algorithm with 5-fold cross validation. It has 16 binary attributes and 2 classes.	2
11	In Experiment 10, Estimate the accuracy of Naive Bayes algorithm using 5-fold cross validation on the house-votes data set.	2

Approved in Academic Council held on 28 July 2021

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

<table>
<tr><td>12</td><td>In Experiment 10, Estimate the precision, recall, accuracy, and F-measure using 10-fold cross-validation.</td><td>2</td></tr>
<tr><td>13</td><td>Consider Breast Cancer data set provided in class. It has 9 numeric attributes and 2 types of cancer to be predicted. Compare the performance of 10 machine learning models for given classification data set for the data partition of 70-30%.
<table><tr><th>Model</th><th>Sensitivity</th><th>Specificity</th><th>Precision</th><th>Recall</th><th>Accuracy</th><th>F-Score</th></tr><tr><td>M1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>M2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>...</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>M10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>2</td></tr>
<tr><td>14</td><td>Ensemble the models from Experiment 13 for given data set on data partition of 70-30%.
<table><tr><th>Model</th><th>Combination</th><th>Sensitivity</th><th>Specificity</th><th>Precision</th><th>Recall</th><th>Accuracy</th></tr><tr><td>E1</td><td>M1, M5, M6, M7, M10</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>E2</td><td>M1, M2, M4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>E3</td><td>M2, M4, M6, M8, M10</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>E4</td><td>M5, M7, M8</td><td></td><td></td><td></td><td></td><td></td></tr></table></td><td>2</td></tr>
<tr><td colspan="2">Total Lab hours</td><td>28</td></tr>
</table>

Suggested Books/Resources:

1. Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp by Peter Norvig
2. Programming in Prolog-Springer by William F. Clocksin, Christopher S. Mellish
3. Machine Learning by Tom M. Mitchell
4. Prediction Machines: The Simple Economics of Artificial Intelligence by Ajay Agrawal , Joshua Gans , Avi Goldfarb
5. Artificial Intelligence a Modern Approach, 3rd Edition. Prentice Hal
6. Artificial Intelligence Hardcover by Elaine Rich and Kevin Knight
7. Link to topics related to course:
   i. https://www.ibm.com/developerworks/library/cc-beginner-guide-machine-learning-ai-cognitive/index.html
   ii. https://ai.google/education/

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	3	3	2	1	2	1	2	1	2	2	2	2
CO-2	3	3	3	2	3	2	1	2	1	2	3	2	2.3
CO-3	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-4	3	3	3	3	2	1	2	2	2	2	3	2	2.3
CO-5	3	3	3	3	2	1	2	2	2	2	2	2	2.3
Average	3	3	3	2.6	2	1.4	1.6	2	1.6	2	2.6	2	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Artificial intelligence Techniques for Genomics Signal Processing

COURSE CODE: 20B1WEC735

COURSE CREDITS: 3

CORE/ELECTIVE: Open Elective

L-T-P: 3-0-0

Pre-requisite: Engineering Mathematics, MATLAB Programming/Python Programming/R programming,

Course Objectives:

1. This course has been designed for the students of CSE/IT/ECE/BT & Bioinformatics.
2. It will provide the ability to students to extract the hidden information about the diseases and different functionalities in the living organism via the processing of the genomics data (It's a kind of Big Data) using Artificial intelligence and signal processing.
3. In this course basic introduction of genomics, numerical representation of the DNA sequences, preprocessing/de-noising and feature techniques, and applications of machine learning, deep learning and transfer learning will be discussed.
4. With completion of the course students may find the opportunities in the companies, which are working on the genomics data or Bioinformatics.

Course Outcomes:

Course Outcomes ()		**Level of Attainment**
CO-1	Student will be familiar with the genomics signal processing	Familiarity
CO-2	Student will able to understand the pre-processing and de-noising techniques	Assessment
CO-3	Student will able to understand the artificial neural network along with its training and testing.	Assessment
CO-4	Student will able to understand the deep learning techniques along with its implementation.	Assessment
CO-5	Student will able to apply the artificial intelligence techniques in genomics signal processing.	Usage

Course Contents:

S. No.	**Contents**	**Contact Hours**
1	**Genomics signal processing** Basics of genomics, genomics signal processing. Numerical mapping schemes for the DNA sequences. Hands on practice using MATLAB/Python/R	06
2	**Feature extraction techniques and de-noising techniques** DFT, DWT, CWT, STFT, WVD, and other spectral methods. Hands on practice using MATLAB/Python/R	08

Approved in Academic Council held on 25.10.2018

IQAC

3	**Artificial neural network** Introduction to supervised, unsupervised, reinforcement learning, learning rule, and activation functions, artificial neural networks. Training of ANN in MATLAB/Python/R	08
4	**Deep learning methods** Convolution neural network, LSTM, pre-trained networks and other networks, Hands on practice using MATLAB/Python/R	08
5.	**Applications of artificial intelligence techniques in genomics signal processing.** Hands on practice of artificial intelligence techniques in genomics signal processing applications using MATLAB programming/Python programming/R-programming.	12
	Total	**42**

Suggested Text Book/Study Material(s):

1. Dougherty ER, Shmulevich I, editors. **Genomic signal processing and statistics.**Hindawi Publishing Corporation; 2005.
2. Data Analytics in Bioinformatics: A Machine Learning Perspective. 2021.
3. Yu N, Li Z, Yu Z. "Survey on encoding schemes for genomic data representation and feature learning—from signal processing to machine learning", Big Data Mining and Analytics. 2018.
4. Min, Seonwoo, Byunghan Lee, and Sungroh Yoon. "Deep learning in bioinformatics." Briefings in bioinformatics 18, no. 5,2017.
5. Dias R, Torkamani A. **Artificial intelligence in clinical and genomic diagnostics**. Genome medicine. 2019.
6. Latest research paper from reputed journals

Suggested Reference Book(s):

1. Advanced Machine Learning and Signal Processing, is part of the IBM Advanced Data Science Specialization

   https://www.coursera.org/learn/advanced-machine-learning-signal-processing#syllabus
2. Machine learning for signal processing

   http://home.iitk.ac.in/~vipular/stuff/2019_MLSP.html
3. Deep learning for signal processing

   https://www.kdnuggets.com/2020/07/deep-learning-signal-processing.html
4. Rahman, M. Z. U., &Putluri, S. (2021). *Genomic Sequence Analysis for Exon Prediction Using Adaptive Signal Processing Algorithms*. CRC Press.
5. Shmulevich, I. and Dougherty, E.R., 2010. *Probabilistic Boolean networks: the modeling and control of gene regulatory networks*. Society for Industrial and Applied Mathematics.
6. Aparna G, Mary GA, Sumana G. Performance Analysis of Signal Processing Techniques in Bioinformatics for Medical Applications Using Machine Learning Concepts.
7. Shmulevich I, Dougherty ER. **Genomic signal processing**. Princeton University Press; 2014 Sep 8.
8. Rahman, M. Z. U., &Putluri, S. "Genomic Sequence Analysis for Exon Prediction Using Adaptive Signal Processing Algorithms". CRC Press.2021
9. Randhawa, G., Hill, K. & Kari, L. ML-DSP: Machine Learning with Digital Signal Processing for ultrafast, accurate, and scalable genome classification at all taxonomic levels. BMC Genomics, 2019
10. Introduction to genomic signal processing with control. CRC Press; 2018

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

11. Morales JA, Saldaña R, Santana-Castolo MH, Torres-Cerna CE, Borrayo E, Mendizabal-Ruiz AP, Vélez-Pérez HA, Mendizabal-Ruiz G. Deep Learning for the Classification of Genomic Signals. Mathematical Problems in Engineering. 2020

Other useful resource(s):

1. Genomic Signal Processing and Data Science
   http://users.ece.utexas.edu/~hvikalo/ee381v.html
2. Genomics Signal Processing
   https://alterlab.org/teaching/BME6770/Syllabus.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

COs/POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	2	2	3	3	2	3	3	3	3	2.666667
CO-2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-3	3	3	3	3	3	2	3	3	2	3	3	3	2.833333
CO-4	3	3	3	3	3	3	2	3	3	3	3	3	2.916667
Average	3	3	2.75	2.75	2.75	2.75	2.75	2.75	2.75	3	3	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Automation and Robotics

COURSE CODE: 20B1WEC731

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Prerequisite: None

Course Objectives:

1. To develop the student's knowledge in various robot structures and their workspace.
2. To use the robotic system for logic building & programming and to solve many engineering problems.

Course Outcomes:

Sl. No.	Course Outcomes	Level of Attainment
1	Learn about brief history, types, requirement and architecture of automation, and their applications	Familiarity
2	Learn about PLC, DCS and SCADA, and their applications	Assessment
2	Learn basic principles of robotics, its configurations, kinematics, dynamics, motion planning and control	Assessment
3	Acquire knowledge about the principles of various sensors, actuators and their applications in robots.	Assessment
4	Understand the concept of dynamics and control for a typical pick and place robot.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction: History of automation, Automation systems, types of automation, Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Advantages and limitations of Automation, Industrial revolutions.	6
2	Automation components: Sensors and actuators, Electric, Hydraulic, Pneumatic, actuators, process control valves, Introduction of DC and AC servo drives for motion control. Controllers, Transmitters and Signal Conditioning: Need of transmitters, Standardization of signals, Current, Voltage and Pneumatic signal standards, 2-Wire & 3-Wire transmitters, Analog and Digital signal conditioning for sensors, Smart and Intelligent transmitters	8
3	PLC, SCADA & Distributed control system: Elements of SCADA, Features of SCADA, MTU, RTU Functions, Applications of SCADA, Communications in SCADA, Introduction to DCS, Architecture, Input and output modules, Specifications of DCS	6

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Introduction to Robotics: Definition of robot, types of robots, classification and usage, Terminology of robotics, Specifications of robot, Architecture of robotic systems, Robot Sensors and Machine Vision System: Internal and external sensors: position, velocity and acceleration sensors, proximity sensors, force sensors, laser range finder; Robot vision: image processing fundamentals for robotic applications	8
5	Robot Arm Kinematics and Dynamics:Position and orientation of a rigid body, Homogeneous transformations, Forward kinematics, Inverse kinematics, Lagrange formulation of dynamics	6
6	Motion Planning and Control: Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link and two-link manipulators, Independent joint PD and PID control, Control of a multi-link manipulator	6
Total lectures		42

Suggested Text Book(s):

1. J. J. Craig, "Introduction to Robotics- Mechanics and Control", Pearson,3rd Edition, 2009.
2. Spong and Vidyasagar, "Robot Dynamics and Control", Wiley Student Edition, John Wiley and Sons, 2013.
3. Madhuchhanda Mitra, SamarjitSen Gupta, "Programmable Logic controllers and Industrial Automation", Penram International, 2008
4. C.D. Johnson, "Process Control Instrumentation Technology", 8th Ed., PHI, 2015

Suggested Reference Book(s):

1. Sciavicco and Siciliano, "Modeling and Control of Robot Manipulators", Springer, 2nd Edition, 2002.
2. D.K. Pratihar, "Fundamentals of Robotics", Narosa Publishing House, 1st Edition, 2017.
3. AshitavaGhoshal, "Robotics-Fundamental Concepts and Analysis", Oxford University Press, 6thImpression, 2010. 8.
4. R. K. Mittal and I. J. Nagrath, "Robotics and Control", Tata McGraw Hill, New Delhi, 4th Reprint, 2005.
5. Gregory K. McMillan, P. Hunter Vegas, "Process / Industrial Instruments and Controls Handbook," 6th Ed., McGraw Hill, 2019
6. Bela G. Liptak, KrisztaVenczel, "Instrument and Automation Engineers' Handbook: Process Measurement and Analysis," 5th Ed., CRC Press, 2016

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/112101099/
2. Other links to course material: https://nptel.ac.in/downloads/112101098/
3. Material provided by IIT Bombay under eLSI project: http://elsi.e-yantra.org/resources

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3	T-3	35	2 Hours	Entire Syllabus

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

.				
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Automation and Robotics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	1	1	2	2	2	**1.8**
CO-2	3	3	3	2	3	2	2	1	1	2	3	3	**2.3**
CO-3	3	3	3	3	3	3	3	1	2	3	3	3	**2.8**
CO-4	3	3	3	3	3	3	3	1	2	3	3	3	**2.8**
CO-5	3	3	3	3	3	3	3	1	2	3	3	3	**2.8**
Average	**2.8**	**2.8**	**2.8**	**2.6**	**2.8**	**2.6**	**2.6**	**1**	**1.6**	**2.6**	**2.8**	**2.8**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Building Drawing Lab

COURSE CODE: 18B17CE771

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 1-0-4

Pre-requisite: Individuals with knowledge of engineering drawing,understanding of architectural terminology and compatible with using windows operating system.

Course Objectives:

1. Learn the AutoCAD user interface.
2. Create sites, profiles, and cross-sections.
3. Use plan production tools to create plan and profile sheets.
4. Prepare detail drawings and Generate perspective view.
5. Creating a 3D building model with walls, curtain walls, windows, and doors
6. Adding floors, ceilings, and roofs to the building model.
7. Adding component features, such as furniture and equipment.
8. Setting up sheets for plotting with text, dimensions, details, tags, and schedules.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Create, edit, view, and analyze surfaces and sites, profiles, and cross-sections, Prepare detail drawings	Assessment
CO-2	Generate perspective view of simple buildingand use plan production tools to create plan and profile sheets.	Assessment
CO-3	Adding floors, ceilings, and roofs to the building model, component features, such as furniture and equipment.	Assessment
CO-4	Creating a 3D building model with walls, curtain walls, windows, and doors	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Contents:

Unit	Contents	Lectures
1	Product Overview, AutoCAD Civil 3D Workspaces, Start Tab, AutoCAD Civil 3D User Interface, AutoCAD Civil 3D Toolspace	2
2	Lines and Curves, Introduction to Parcels, Creating and Editing Parcels by Layout Overview, Surface Process, Breaklines and Boundaries, Surface Analysis Tools	2
3	Creating Alignments from Objects, Creating and Modifying Alignments, Labels and Tables, Create Profiles from Surface, Generate perspective view of simple building	2
4	Creating a Corridor, Creating Sections, Plan Production Tools, Prepare detail drawings for single and two storied residential building	2
5	Introduction to BIM and Autodesk Revit, Basic Sketching and Modify Tools, Setting Up Levels and Grids	2
6	Working with Doors and Windows, curtain walls, views, Adding Components, Modeling Floors, ceilings and roofs, Stairs, Railings, and Ramps	2
7	Creating Construction Documents, Adding Tags and Schedules and Creating Details in building	2
Total lectures		**14**

List of Experiments:

Sr. no.	Description	Hours
1	AutoCAD Civil 3D User Interface, AutoCAD Civil 3D Toolspace, Draw symbols, conventions and Abbreviations	3
2	Lines and Curves, Introduction to Parcels, Creating and Editing Parcels by Layout Overview, Surface Process, Breaklines and Boundaries	3
3	Surface Process, Breaklines and Boundaries	3
4	Generate perspective view of simple building	3
5	Plan Production Tools, Prepare detail drawings for single and two storied residential building	3
6	Introduction to BIM and Autodesk Revit, Basic Sketching and Modify Tools	3
7	Doors and Windows, curtain walls	3
8	Floors, ceilings and roofs, Stairs, Railings, and Ramps	3

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

9	Adding Tags and Schedules and Creating Details in building	4
Total		**28**

Suggested Textbook(s):

- V. B. Sikka, "Civil engineering drawing", Charotar Publication
- Gurcharan singh, Subash chander, "Civil engineering drawing", published by Standard Publishers Distributors
- R. S. Malek G. S. Meo, "Civil engineering drawing", Computech Publication Ltd New Asian

Other useful resource(s):

1. nptel.ac.in/
2. www.Autodesk.com
3. www.drawingnow.com
4. www.learn-to–draw.com

EvaluationScheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the ProgrammeOutcomes (POs)

Course Outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	2	3	2	1	2	2	1	3	3	1	3	**2.16**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO2	3	2	3	3	3	2	2	2	3	2	2	3	**2.5**
CO3	2	2	2	2	1	2	3	2	2	2	2	3	**2.08**
CO4	2	2	3	2	1	2	2	1	2	1	2	2	**1.83**
Average	**2.5**	**2**	**2.75**	**2.25**	**1.5**	**2**	**2.25**	**1.5**	**2.5**	**2**	**1.75**	**2.75**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

17. Cloud Computing: Concepts, Technology & Architecture

COURSE CODE: XXX
COURSE CREDITS: 2
CORE/ELECTIVE: CORE
L-T-P: 2-1-0

Pre-requisite: Knowledge of Computer Architecture, Computer Networking and Distributed Computing.
Course Objectives:

1. To demonstrate an understanding of cloud computing concepts and standards.
2. To understand all enabling technologies of Cloud computing.
3. To discuss issues and challenges pertaining to management of emerging cloud computing technologies and learn approaches to manage them.
4. To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To learn basic concepts of infrastructure management and load balancing.	Familiarity
CO-3	To learn basic concepts of cloud security and metrics for evaluation.	Assessment
CO-4	To understand cloud computing and its role in new distributed computing implementation.	Assessment

Course Contents:

Unit / Module	Contents	Lectures required
1	**Understanding Cloud Computing:** Lect 1: Basic Concepts and terminology, Goals and Benefits Lect 2: Risks and Challenges, Roles and boundaries, Cloud characteristics Lect 3: Cluster Computing, Grid Computing Lect 4: NIST Architecture, Cloud Deployment models Lect 5: Cloud service models	5
2	**Cloud Enabling Technologies:** Lect 6,7: Virtualization, Types of virtualization, Server Consolidation, virtualization management Lect 8: Web Technology Lect 9: Service Oriented Architecture Lect 10: Datacenter and Multi-tenancy	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**Cloud Infrastructure Management:** Lect 11,12: Cloud datacenter design, Workloads and software infrastructure for a datacenter Lect 13,14: Datacenter hardware, energy and power efficiency in a datacenter Lect 15: Cloud usage monitor, Monitoring agent, Resource agent, Polling Agent	**5**
4	**Cloud Mechanisms:** Lect 16: Automated Scaling Lect 17, 18: Load Balancer Lect 19: SLA Monitor Lect 20: Failover System Lect 21: Multi-Cloud Broker	**6**
5	**Load Magement:** Lect 22,23: Fundamental Cloud Architectures: workload distribution architecture, resource pooling architecture, dynamic scalability architecture, service load balancing architecture, cloud brusting architecture Lect 24, 25 : Billing Management System Lect 26,27: Business cost metrics, cloud usage cost metrics	**6**
6	**Metrics & security:** Lect 28: Cloud service metrics Lect 29: Cloud Security Lect 30: Mobile cloud computing Lect 31: Disaster recovery in cloud computing Lect 32: Case studies	**5**
	Total lectures	**32**

Suggested Text Book(s):

- Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568.
- Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.

Suggested Reference Book(s):

- Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
- The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
- Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
- The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos.

Other useful resource(s):

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

- Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
- Link to topics related to course:
  i. **https://www.edx.org/learn/cloud-computing**
  ii. **https://www.udemy.com/introduction-to-cloud-computing/**
  iii. https://nptel.ac.in/courses/106104019/2

Evaluation Scheme

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Tutorials / Assignments, Quizzes, Attendance	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course outcomes:

S No	Course outcomes (Cloud Computing: Concepts, Technology & Architecture)	Level of Attainment
CO-1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO-2	To understand different enabling technologies for Cloud computing environment.	Assessment
CO-3	To design Cloud computing data-center for effective utilization of available resources	Usage
CO-4	To study different managers related to Cloud computing services	Assessment
CO-5	To understand different case studies of Cloud computing and its advance topics	Usage

Course Outcomes (COs) contribution to the Programme Outcomes (POs):

Course outcomes ((Cloud Computing: Concepts, Technology & Architecture)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	
Average													

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

18. Cloud Computing: Concepts, Technology & Architecture Lab

COURSE CODE: XXXXXXXX
COURSE CREDITS: 1
CORE/ELECTIVE: CORE
L-T-P: 0-0-2
Pre-requisite: Knowledge of Visualization, Web Service Architecture, Computer Architecture, Computer Networking and Distributed Computing.

Course Objectives:

- To demonstrate various Visualization Platform.
- To demonstrate an understanding of cloud computing concepts and standards.
- To understand all enabling technologies for Cloud Deployment.
- To demonstrate the practical implementation and usage scenarios of Cloud computing.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	To learn the basic concepts, applications and terminology of cloud computing.	Familiarity
CO2	To learn basic concepts of infrastructure management and load balancing.	Familiarity
CO3	To learn basic concepts of cloud security and metrics for evaluation.	Assessment
CO4	To understand cloud computing and its role in new distributed computing implementation.	Assessment

List of Experiments:

S No	Description	Hours
1	Introduction to Infrastructure as a Service Platforms like EC2 (AWS). Demonstrate the creation of computing platform.	2
2	Demonstrate management and deployment for IAAS platform by Remote Access platforms (Putty, remote desktop, etc).	2
3	Introduction to Visualization and its various types (Hypervisor type0 and type1).	2
4	Implementation to Visualization platforms (Sun Virtual Box, VM workstation, Zen, KVM) for Virtual Machine (VM) creation and management.	4
5	Implement and Management of various Virtual disk standards and VM imaging formats for Virtual Machine.	2
6	Implementation and installation of a Cloud management platform like	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

57
IQAC

	open-stack / Eucalyptus etc.	
7	Creating a Warehouse Application in SalesForce.com.	2
8	Implementation and Deployment of a Platform as a Service Platform like Google App engine/ microsoft azure etc.	2
9	Installation and Configuration of Hadoop.	2
10	Introduction to Cloud Simulation Platforms Like CloudSim and Green Cloud.	2
	Total Lab hours	**24**

Suggested/Resources:

- Cloud Computing: Concepts, Technology & Architecture, by Zaigham Mahmood, Thomas Erl, Ricardo Puttini, Prentice Hall, ISBN: 9780133387568.
- Cloud Computing Bible, by Barrie Sosinsky, Barrie Sosinsky.
- Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter; Tata McGraw – Hill Edition
- The Datacenter as a Computer – An Introduction to the Design of Warehouse Scale Machines by Luiz Andre Barroso and Urs Holzle; Morgan and Claypool Publishers
- Cloud Computing Explained: Implementation Handbook for Enterprises by John Rhoton
- The Cloud at Your Service by Jothy Rosenburg and Arthur Mateos.
- Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc17_cs23/preview
- Link to topics related to course:
  a. https://www.edx.org/learn/cloud-computing
  b. https://www.udemy.com/introduction-to-cloud-computing/
  c. https://nptel.ac.in/courses/106104019/2Ev

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	**100 Marks**

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
C06	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Comparative and Functional Genomics

COURSE CODE: 18B1WBT532

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Molecular Biology, Biochemistry

Course Objectives:

1. The course is intended to provide thorough understanding of the genomics i.e. modern technologies in whole genome sequencing, genome mining, comparative genomics, global gene function technologies, protein structure & function technologies at the genome level, etc.
2. The course will explore that how technological innovations fostered by the Human Genome Project, will lead to significant advances in our understanding of diseases that have a genetic basis and, more importantly, how health care will be delivered from this point forward

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will have a thorough understanding of various genomic technologies such as whole genome mapping & sequencing, genome annotation, global gene cloning and gene expression technologies, comparative genomics, introduction to pharmacogenomics	Familiarity
CO-2	The students will know the vast amount of genome information in publically available databases and how to access and best utilize for practical purposes.	Assessment
CO-3	Able to analyze the gene expression data sets to derive the biologically meaning information	Assessment
CO-4	Able to apply the knowledge of function genomics in public health	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to genomics:**Genome organization of Model organism- E. coli, Yeast, Mice, A. thaliana, Human etc. Genome statistics	3
2	**First and 2nd generation sequencing:**Sanger sequencing and next generation sequencing; Reverse termination sequencing, Single cell RNA sequencing or single cell RNA sequencing and Applications	8
3	**Comparative genomics:**Genome Annotation i.e. Mining Genomic Sequence Data, gene prediction methods, Physical mapping, Metagenomics, evolutionary relationship, Genome Analysis, Functional maps (Transcriptome, proteome, metabolome) Metabolic network maps	8
4	**Functional genomics tools:**Hybridization and sequencing based approaches. Serial Analysis of Gene Expression-SAGE, DNA- Microarray, Application of DNA Microarray, cDNA-PCR, etc.	8
5	**SNP:**SNP Technologies: Platforms & Analysis Haplotyping: Concepts and Applications and relevance in cancer Biology	7
6	**Regulation of gene expression:**Gene Function Technologies (Gene Targeting, Gene Silencing (RNAi), micro RNA-human and Drosophila	4
	Biomarkers Pharmacogenomics: Concepts and Applications in Healthcare Role	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

7	of genotype in drug metabolism Identification & Utilisation of cancer bio-marker	4
Total Lectures		**42**

Suggested Text Book(s):

1. Discovering Genomics, proteomics & bioinformatics. Second edition by A Malcolm Campbell, Davidson College; Laurie J. Heyer Davidson College ; With Foreword by Francis S. Collins
2. Molecular Biology of the Gene (1987) Watson J. D., Hopking N., Robast J. and Steiz, J.
3. BIOINFORMATICS: A Practical Guide to the Analysis of Genes and Proteins (Third edition) Andreas D. Baxevanis& B. F. Francis Ouellette

Suggested Reference Book(s):

1. Ronaghi M. Pyrosequencing sheds light on DNA sequencing. Genome Res. 2001 Jan;11(1):3-11. Review. PubMed PMID: 11156611
2. Schulze A, Downward J. Navigating gene expression using microarrays—a technology review. Nat Cell Biol. 2001 Aug;3(8):E190-5. Review. PubMed PMID: 11483980
3. Kim JB, Porreca GJ, Song L, Greenway SC, Gorham JM, Church GM, Seidman CE, Seidman JG. Polony multiplex analysis of gene expression (PMAGE) in mouse hypertrophic cardiomyopathy. Science. 2007 Jun 8;316(5830):1481-4. PubMed PMID: 17556586
4. MacBeath G, Schreiber SL. Printing proteins as microarrays for high-throughput function determination. Science. 2000 Sep 8;289(5485):1760-3. PubMed PMID: 10976071.
5. Shankar J, Wu TD, Clemons KV, Monteiro JP, Mirels LF, et al. (2011) Influence of 17b-Estradiol on Gene Expression of Paracoccidioides during Mycelia-to- Yeast Transition. PLoS ONE 6(12): e28402. doi:10.1371/journal.pone.0028402
6. Mary V. Relling, William E. Evans Nature. Author manuscript; available in PMC 2016 Jan 13.
7. Published in final edited form as: Nature. 2015 Oct 15; 526(7573): 343–350. doi: 10.1038/nature15817

Other useful resource(s):

1. Link to NPTEL course contents:https://nptel.ac.in/courses/102104056/

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	2	2	2	2	1	2	1.9
CO-2	2	2	2	2	2	1	1	2	2	2	1	2	1.75
CO-3	2	2	2	2	2	1	1	1	2	-	2	2	1.7
CO-4	2	2	2	2	2	1	1	1	2	2	-	2	1.7
Average	2.0	2.0	2	2	2	1.25	1.25	1.5	2.0	2	1.33	2.0	

Approved in Academic Council held on 25.10.2018

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Comparative and Functional Genomics
Course Code: 10B11BT611 Core Course
Credits: 4
L 3 T 1 P 0
Pre-requisites: Molecular Biology, Biochemistry

Course Objectives (Learning Goal):

1. The course is intended to provide thorough understanding of the genomics i.e. modern technologies in whole genome sequencing, genome mining, comparative genomics, global gene function technologies, protein structure & function technologies at the genome level, etc.
2. The course will explore that how technological innovations fostered by the Human Genome Project, will lead to significant advances in our understanding of diseases that have a genetic basis and, more importantly, how health care will be delivered from this point forward

Course Outcomes:

CO I: Students will have a thorough understanding of various genomic technologies such as whole genome mapping & sequencing, genome annotation, global gene cloning and gene expression technologies, comparative genomics, introduction to pharmacogenomics, proteomics.

CO II: The students will know the vast amount of genome information in publically available databases and how to access and best utilize for practical purposes.

CO III: Able to analyze the gene expression data sets to derive the biologically meaning information

CO IV: Able to apply the knowledge of function genomics in public health

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topics covered:

Genes and Genomes, Genome Organization, Exon-Introns, Alternate splicing, Model Genomes: Prokaryotes & Eukaryotes. Genetic and Physical Mapping of Genomes. Whole Genome Sequencing Technologies (Next generation sequencing Pyrosequencing & Reverse termination sequencing). Genome Annotation i.e. Mining Genomic Sequence Data, gene prediction methods, Comparative genomics. SNP Technologies: Platforms & Analysis Haplotyping: Concepts and Applications. Pharmacogenomics: Concepts and Applications in Healthcare. Global Gene Cloning & Expression Platforms & Technologies (Differential Display, SAGE, Microarrays, cDNA-AFLP, etc.). Gene Function Technologies (Gene Targeting, Gene Silencing (RNAi)). Proteomics: Protein-Protein Interactions; Protein Arrays, global analysis of protein modifications. Proteomics: Protein Structure and functions prédiction (and Analysis). Biomarkers : Identification & Utilization

Topic	Lectures	Learning Outcomes
Module-I: Genes, Genome of Prokaryotes vs Eukaryotes		**CO-I**
Genes and Genomes, Genome Organization,	1	
Exon-Introns, Alternate splicing	1	
Model Genomes: Prokaryotes & Eukaryotes	1	
Module-II: Genome Mapping & Sequencing Technologies		**CO-II**
Mapping of Genomes	2	
Whole Genome Sequencing Technologies (Next generation sequencing Pyrosequencing & Reverse termination sequencing)	4	
Genome Annotation i.e. Mining Genomic Sequence Data, gene prediction methods, Comparative genomics or metagenomics	4	
Module-III: Gene Function & genomic Technologies		**CO III**
Global Gene Cloning & Expression Platforms & Technologies (Differential Display, SAGE, Microarrays, cDNA-AFLP, etc.)	5	
Proteomics: Protein Structure and functions prédiction (and Analysis)	4	
Proteomics: Protein-Protein Interactions; Protein Arrays, global analysis of protein modifications	5	
Gene Function Technologies (Gene Targeting, Gene Silencing (RNAi))	4	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Module-IV: Application domains of genome technologies		**CO IV**
SNP Technologies: Platforms & Analysis Haplotyping: Concepts and Applications	4	
Pharmacogenomics: Concepts and Applications in Healthcare	5	
Biomarkers : Identification & Utilization	2	
Total Lectures	**42**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Assignments: 1

Marks: 05

Describe gene expression study (pick one) using Microarray from Gene Expression Omnibus (GEO) database

Date of submission

Date of Feedback:

B. Assignment: *Each Student will take a research paper and prepare a report based on following point:*

a. What is the objective of the their work or question the are addressing

b. what approach or methodologies they have considered and why, to address the questions

c. what is the results

d. Did the authors addressed the question with the result they obtained

e. what is your technical and scientific input in their paper if you are critically analyzing the paper?

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Examinations	Marks (%)	Duration (hrs)
First Term (T-I)	15	1:00
Mid Term Test (T-II)	25	1:30
End Term Test (T-III)	35	2:00
Teacher Assessment (Based on assignments, quizzes, research paper reading and group discussion, case studies, etc.) Attendance: 5 Participation in group discussions in lectures/tutorials: 10 Assignment/ Case Studies: 10	25	Entire Semester
Total	100	

Reference;

1. Discovering Genomics, proteomics & bioinformatics. Second edition by A Malcolm Campbell, Davidson College; Laurie J. Heyer Davidson College ; With Foreword by Francis S. Collins
2. Molecular Biology of the Gene (1987) Watson J. D., Hopking N., Robast J. and Steiz, J.
3. BIOINFORMATICS: A Practical Guide to the Analysis of Genes and Proteins (Third edition) Andreas D. Baxevanis & B. F. Francis Ouellette
4 From Genes to Genomes: Concepts and Applications of DNA Technology by JW Dale and M Schantz

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Data Analysis

COURSE CODE: 19B1WCI731
COURSE CREDITS: 2
CORE/ELECTIVE: ELECTIVE
L-T-P: 2-0-0
Pre-requisite: Basics of probability and statistics
Course Objectives:

1. To provide students with the foundational knowledge of topics such as probability and statistics and algorithms to solve data analysis problems arising in practical applications,
2. To enable students to effectively apply computational methods to solve exemplar data analysis problems arising in relevant applications.
3. Have a good understanding of the fundamental issues and challenges of machine learning.
4. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
5. Be able to design and implement various machine learning algorithms in a range of real-world applications.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	To learn the basic concepts and terminology in statistics used in machine learning	Familiarity
CO-2	To understand the concepts associated with the classification and experimental evaluation of classification algorithms	Familiarity
CO-3	To learn about clustering and unsupervised learning	Assessment
CO-4	To learn about various techniques for selecting relevant features selection.	Assessment
CO-5	To learn about various techniques for enhancing the performance of basic machine learning algorithms.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	Supervised Learning, Discriminative Algorithms: Supervised Learning Concept, Linear Regression, Maximum Likelihood, Normal Equation, Gradient Descent, Stochastic Gradient, SVRG. Linear Classification, Logistic Regression.	5
2	Generative Algorithms: Multivariate Normal, Linear Discriminant Analysis, Naive Bayes, Laplacian Smoothing, Multiclass Classification, K-NN Multi-class Fisher Discriminant Analysis, Multinomial Regression Support Vector Machines and Kernel Methods: Intuition, Geometric Margins, Optimal Margin Classifier, Multiclass SVM	5
3	Unsupervised Learning: EM Algorithm, DBSCAN, k-means, *Hierarchical clustering*	4

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Regularization, Model Selection, and Optimization: Cross-Validation, Bayesian Optimization Bayesian Regression, Bayesian Logistic Regression Forward and Backward Regression, Lasso, elastic-net. Proximal Gradient, Prox-SVRG. Coordinate Proximal Gradient, Pathwise Coordinate Descent	5
5	Feature Selection: Information Gain, Correlation Coefficient, Chi-square test, PCA	4
6	Ensemble Learning: Bagging, Boosting, Stacking, Entropy, Building Tree, Bagging features, Bagging Samples, Random Forest, Adaboost, Gradient Tree Boosting	5
	Total Lecture Hours	**28**

Suggested Text Book(s):

- Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
- Introduction to Machine Learning Edition 2, by Ethem Alpaydin.
- T. Hastie, R. Tibshirani, & J. H. Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer Verlag, 2001.

Suggested Reference Book(s):

- The Elements of Statistical Learning, 2nd Edition, Hastie, Tibshirani and Friedman.
- Foundations of Machine Learning, Mohri, Rostamizadeh and Talwalker
- Richard o. Duda, Peter E. Hart, and David G. Stork, "Pattern Classification", John Wiley Asia, 2006

Other useful resources (s):

- Link to NPTEL course contents: https://nptel.ac.in/courses/106106139/
- https://nptel.ac.in/courses/110106064/

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Computational Data Analysis)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	1	2	2	1	3	2	1	1	1	1	1	1	1.4
Average	1.8	2.4	2.4	2.2	2.6	1.2	1	1	1.8	2	1.4	1.8	1.8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Data Analysis Lab

COURSE CODE: 19B1WCI771
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2
Pre-requisite: Python Programming Language

Course Objectives:

1. To develop students' skills in software development techniques using one or more high-level programming languages relevant to data analytics.
2. To enable students to effectively apply computational methods to solve exemplar data analysis problems arising in relevant applications.
3. To learn the implementation of classification techniques for any dataset.
4. To conduct experiments for clustering techniques for any dataset.
5. To discuss different classification and clustering algorithms based on the analysis of results obtained from the experimental evaluation.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	To learn and implement the basic concepts and terminology in statistics used in machine learning	Usage
CO2	To implement classification and clustering algorithms in python	Usage
CO3	To implement feature selection methods in Python	Usage
CO4	To compare different algorithms based on some common factors	Assessment

List of Experiments

S No	Description	Hours
1	Visualize data using any plotting framework How to upload a dataset How to retrieve rows and data in the dataset How to delete a certain column in the dataset How to display minimum, maximum value of a particular feature How to display certain rows of a dataset	2
2	Visualize data using any plotting framework How to display certain rows of a dataset How to insert a new row at a particular index Visualization of the dataset (scatterplot, histogram) To find the sum of null values in each column Extracting certain columns	2
3	Implement SVM using different kernel methods like Gaussian Radial Basis Function (RBF), Laplace RBF kernel, ANOVA Radial Basis kernel, Polynomial Kernel.	2
4	Implement Naïve Bayes using Bernoulli model and Multinomial model (Laplace smoothing and Log-Transformation).	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

5	Implement K-NN and DT	2
6	Implement Linear regression and Logistic regression	2
7	Implement the following clustering techniques: K-means, *Hierarchical,*	2
8	Implement the following clustering techniques: *DBSCAN,* EM Algorithm	2
9	Implement various feature selection methods Information Gain Correlation Coefficient	2
10	Implement various feature selection methods Chi-square test PCA	2
11	Implement the following ensemble techniques: XGBoost, AdaBoost	2
12	Implement the following ensemble techniques: Gradient Boosting, Bagging	4
	Total Lab hours	**28**

Suggested/Resources:

- Tom Mitchell, "Machine Learning", McGraw Hill, 1997, ISBN 0070428077
- Sebastian Raschka, "Python Machine Learning", Packt Publishing Ltd.
- Andreas C. Müller, Sarah Guido, "Introduction to Machine Learning with Python", O'Reilly Media, Inc.
- Sunila Gollapudi, "Practical Machine Learning", Packt Publishing Ltd
- Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, Inc.
- Willi Richert, "Building Machine Learning Systems with Python", Packt Publishing Ltd.

Link to topics related to course:

- https://www.python-course.eu/machine_learning.php
- https://www.analyticsvidhya.com/blog/2018/05/24-ultimate-data-science-projects-to-boost-your knowledge-and-skills/
- https://www.datacamp.com/

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	10 Marks
4	Project	20 Marks
5	Lab Assessment	30 Marks
	Total	**100 marks**

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	Average
CO-1	3	2	2	2	3	1	1	1	1	1	2	2	1.8
CO-2	3	3	3	3	3	2	1	2	2	1	2	3	2.3
CO-3	3	3	2	3	3	2	1	2	2	1	2	3	2.3
CO-4	3	3	3	3	3	2	1	2	2	1	2	3	2.3
Average	3	2.8	2.5	2.8	3	1.8	1	1.8	1.8	1	2	2.8	2.2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computational Systems Biology

COURSE CODE: 18B1WBI731

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

To enable students to predict and ultimately control functionalities of complex biological systems

Course Outcomes:

CO I	Able to understand the holistic approaches of systems biology
CO II	Combining acquisition, integration and management of experimental data with computer modeling and simulation
CO III	Use various methods from computational systems biology to learn the engineering aspects of controlling biological systems through reverse engineering
CO IV	Able to analyze biological systems and identify their limiting factors to propose new design principles for the biological systems
CO V	Analyse and interpret biological systems towards the biological knowledge discovery

Course Contents:

Sr. No.	Topics	Hours Allotted
1.	Introduction to Systems biology and associated entities. System and its properties. Types of biological networks and their characteristics. Comparison of bioinformatics, and other similar streams with systems biology and its progression towards synthetic biology.	5
2.	Transcriptional regulatory networks, Genetic Network Analysis and System Discovery. Modelling Complex Biological Systems , Approaches to *Numerical* Simulation of Regulatory Pathways	5
3.	Metabolic Networks and pathways, Mass/Flux Balance Analysis. Characteristics and applications of metabolic pathways. Partial differential equations for the same.	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	XML for Bioinformatics and systems biology, includes BioXML, SBML, CellML and their practical applications towards modelling and simulations of biological systems	6
5.	Signal Transduction Networks and Pathways, their characteristics and applications.	6
6.	Systems Approach to Metabolic Networks and Protien-Protein Interaction Networks, Online tools and databases for Systems biology: STRING, BIND, MINT, IPATH, GeneGo, Gypasi, MetaCYC, Reactome etc.	6
7.	Bio-circuits: Blocks and Designing; Various case studies along with their applications. Petri Nets and modelling.	6
8.	Introduction to bio-electronic Projects: E-Cell and Virtual Cell	2
9.	**Total**	**42**

Suggested Text Book(s):

1. **Systems Modeling in Cellular Biology** by Zoltan Szallasi, Joerg Stelling, Vipul Periwal, MIT Press
2. **Systems Biology : Properties of Reconstructed Networks** by Bernard Palsson, Cambridge Univ. Press
3. **Advances in Systems Biology (Advances in Experimental Medicine and Biology).** Opresko, L., Gephart, J., and Mann, M. (eds.), Plenum US, 2005

Suggested Reference Book(s):

1. **Artificial Intelligence Methods and Tools For Systems Biology** Dubitzky, W. and Azuaje, F. (eds.), Kluwer Academic Publisher
2. **Metabolome Analyses: Strategies for Systems Biology** Vaidyanathan, S. et al (eds.), Springer-Verlag
3. **Systems Biology in Practice: Concepts, Implementation And Application** Klipp, E et al., John Wiley & Sons Inc.
4. **Foundations of Systems Biology** Kitano, H.(ed.); The MIT Press
5. **Systems Biology** Alberghina L. & Westerhoff, H.V., eds.; Springer Verlag.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Computational Systems Biology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	3	1	1	3	2	3	2	2.17
CO-2	2	2	3	2	2	-	-	-	-	1	2	2	2.00
CO-3	3	3	3	2	2	2	1	1	3	2	-	3	2.27
CO-4	2	2	3	1	-	-	-	-	2	2	2	1	1.88
CO-5	3	2	3	2	2	3	-	-	-	2	-	1	2.25
Average	2.4	2.2	2.8	2	2	2.66	1	1	2.67	1.8	2.33	1.8	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Computer Vision

Course Code: 18B1WCI840
Course Credits: 3-0-0
Instructor: Mr. Surjeet Singh
OE for B Tech 8th Sem CSE/IT

Course Outcomes(COs):

Sr No	Course Outcomes (Computer Vision)	Level of Attainment
CO-1	To understand the concepts of digital image processing	Familiarity
CO-2	To understand the concepts of depth estimation and Multi-camera views	Assessment
CO-3	To understand the concepts of Feature Extraction	Assessment
CO-4	To understand the concepts of Image Segmentation	Assessment
CO-5	To understand the concepts of Pattern Analysis	Usage
CO-6	To understand the concepts of Motion Analysis	Assessment
CO-7	To understand the concepts of Shape formation	Usage

Course Outline:

Modules	Contents	Lectures required
Module 1	UNIT - I- Digital Image Formation and low-level processing Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing	5
Module 2	UNIT-II- Depth estimation and Multi-camera views Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration	7
Module 3	UNIT-III- Feature Extraction Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.	6
Module 4	UNIT-IV- Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection	7
Module 5	UNIT-V- Pattern Analysis Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised;	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods	
Module 6	UNIT-VI- Motion Analysis Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation	8
Module 7	UNIT-VII- Shape from X Light at Surfaces; Phong Model; Reflectance Map; Albedo estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, color, motion and edges	4

CO-PO Articulation (Computer Vision)													
Sr No	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	Weightage
CO-1	3	3	3	2	3	3	2	2	2	2	2	3	60%
CO-2	3	3	3	2	2	2	2	2	2	2	2	3	77%
CO-3	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-4	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-5	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	2	3	2	2	2	2	2	2	3	85%
CO-6	3	3	3	3	3	3	3	3	3	3	3	3	70%
Weightage	100 %	100 %	100 %	70 %	80 %	90 %	60 %	80 %	100 %	70 %	80 %	100 %	

CO- PSOs Articulation					
Sr No	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	
CO-1	3	2	2	2	**79**
CO-2	2	3	2	3	**79**
CO-3	3	2	3	2	**81**
CO-4	2	2	2	2	**75**
CO-5	2	3	2	3	**79**
CO-6	3	2	3	2	**79**
Average Score	**81**	**82**	**85**	**76**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Construction Techniques

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Construction Technology and Management

Course Objectives:

1. To study the substructure construction techniques.
2. To create awareness on tall structure construction elements
3. To know about the techniques used for large span structures
4. To study the elements of repair construction.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Students with be familiar with substructure construction techniques	Familiarity
CO2	Students will be able to evaluate construction of tall structures	Assessment
CO3	Students will be able to understand construction of tunnels, bridges and domes	Assessment
CO4	Students will be able to understand the construction techniques related to lattice towers, transmission lines and offshore construction.	Assessment
CO5	Students will be able to evaluate and suggest suitable repair measures for various construction issues.	Usage

COURSE CONTENT:

S.No	Description	Hours
1	**SUB STRUCTURE CONSTRUCTION**: Box Jacking: Need – elements – concept – precautions – advantages. Pipe jacking: Technique – factors – applications – advantages. Diaphragm walls – methods – sheet piles – applications – advantages. Piling techniques: Classifications – factors. Well and caisson: Types – sinking method – precautions. Coffer dam: Purpose – types – techniques. Cable anchoring – screw anchor – necessity- applications. Grouting: Need – materials – techniques – applications – guniting and shotcreting. Well points - dewatering – techniques	**12**
2	**TALL STRUCTURES CONSTRUCTION**: Concrete in tall buildings – types of concrete pumps – factors – blockage – causes - clearing –safety. Slip form techniques: Vertical - chimney – horizontal – concrete paving methods. Suspended form work: Purpose – methods – advantages - erection techniques. Prestressing techniques – in situ prestressing in high rise structures.	**8**

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**LARGE SPAN STRUCTURES CONSTRUCTION**: Tunnelling: Purpose – aspects – shafts – mucking – construction techniques – advantages – trenchless technology. Bow string bridges: Systems – arrangements – advantages. Suspension and cable stayed bridges: Parallel – radial patterns – concept. Domes: Types – structural framing – erection methods. Aerial transportations – components – advantages – applications.	8
4	**SPECIAL STRUCTURE CONSTRUCTION**: Lattice tower: Definition – techniques. Rigging of transmission line structures: Definition –precaution – stages involved. Advanced construction techniques in offshore construction practice: Various operations – under water concrete - vacuum dewatering of concrete flooring. Articulated structure – definition – mechanism	6
5	**REPAIR AND STRENGTHENING TECHNIQUES**: Mud Jacking: Techniques – behavior of slab – advantages. Micro piles: Uses – stages – applications- benefits. Shallow profile pipeline laying – procedure – specifications – sub aqueous pipelines –laying methods. Sheet piles protection techniques. Water proofing: Need – above and below ground. Under pinning: Need – methods. Demolition and dismantling: Principles – methods – modern demolition techniques – controlled demolition – mechanical method – hydro demolition – advantages – sequence of demolition – beams – columns – walls – general sequence.	8
Total Lectures		**42**

Suggested Textbook(s):

1. Roy Chudley, Roger Geeno ,"Advanced Construction Technology" Latest Edition.
2. Ponnuswamy .S,"Bridge Engineering "Second Edition.
3. Sankar, S.K. And Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.
4. Gahlot .P.S & Sanjay Sharma ,"Building repair and maintenance management "CBS Publications.2006

Suggested/Resources:

1. Robertwade Brown, "Practical Foundation Engineering Handbook", McGraw Hill Publications, 2005.
2. Patrick Powers .J, "Construction Dewatering: New Methods and Applications" John Wiley & Sons, 2002.
3. Micheal T.Kubal ,"Construction Waterproofing Handbook".

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Construction Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	2	3	2	1	2	2	1	3	3	1	3	**2.17**
CO2	3	2	3	3	3	2	x	x	3	2	x	3	**2.67**
CO3	2	2	2	2	1	2	3	2	2	2	2	3	**2.08**
CO4	2	2	3	2	1	2	2	1	2	1	2	2	**1.83**
CO5	2	1	2	2	3	2	2	1	3	2	3	2	**2.08**
Average	**2.4**	**1.8**	**2.6**	**2.2**	**1.8**	**2**	**2.25**	**1.25**	**2.6**	**2**	**2**	**2.6**	

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT • ABOVE

Construction Techniques

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Construction Technology and Management

Course Objectives:

1. To study the substructure construction techniques.
2. To create awareness on tall structure construction elements
3. To know about the techniques used for large span structures
4. To study the elements of repair construction.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Students with be familiar with substructure construction techniques	Familiarity
CO2	Students will be able to evaluate construction of tall structures	Assessment
CO3	Students will be able to understand construction of tunnels, bridges and domes	Assessment
CO4	Students will be able to understand the construction techniques related to lattice towers, transmission lines and offshore construction.	Assessment
CO5	Students will be able to evaluate and suggest suitable repair measures for various construction issues.	Usage

COURSE CONTENT:

S.No	Description	Hours
1	**SUB STRUCTURE CONSTRUCTION**: Box Jacking: Need – elements – concept – precautions – advantages. Pipe jacking: Technique – factors – applications – advantages. Diaphragm walls – methods – sheet piles – applications – advantages. Piling techniques: Classifications – factors. Well and caisson: Types – sinking method – precautions. Coffer dam: Purpose – types – techniques. Cable anchoring – screw anchor – necessity- applications. Grouting: Need – materials – techniques – applications – guniting and shotcreting. Well points - dewatering – techniques	12
2	**TALL STRUCTURES CONSTRUCTION**: Concrete in tall buildings – types of concrete pumps – factors – blockage – causes - clearing –safety. Slip form techniques: Vertical - chimney – horizontal – concrete paving methods. Suspended form work: Purpose – methods – advantages - erection techniques. Prestressing techniques – in situ prestressing in high rise structures.	8

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	**LARGE SPAN STRUCTURES CONSTRUCTION**: Tunnelling: Purpose – aspects – shafts – mucking – construction techniques – advantages – trenchless technology. Bow string bridges: Systems – arrangements – advantages. Suspension and cable stayed bridges: Parallel – radial patterns – concept. Domes: Types – structural framing – erection methods. Aerial transportations – components – advantages – applications.	**8**
4	**SPECIAL STRUCTURE CONSTRUCTION**: Lattice tower: Definition – techniques. Rigging of transmission line structures: Definition –precaution – stages involved. Advanced construction techniques in offshore construction practice: Various operations – under water concrete - vacuum dewatering of concrete flooring. Articulated structure – definition – mechanism	**6**
5	**REPAIR AND STRENGTHENING TECHNIQUES**: Mud Jacking: Techniques – behavior of slab – advantages. Micro piles: Uses – stages – applications- benefits. Shallow profile pipeline laying – procedure – specifications – sub aqueous pipelines –laying methods. Sheet piles protection techniques. Water proofing: Need – above and below ground. Under pinning: Need – methods. Demolition and dismantling: Principles – methods – modern demolition techniques – controlled demolition – mechanical method – hydro demolition – advantages – sequence of demolition – beams – columns – walls – general sequence.	**8**
Total Lectures		**42**

Suggested Textbook(s):

1. Roy Chudley, Roger Geeno ,"Advanced Construction Technology" Latest Edition.
2. Ponnuswamy .S,"Bridge Engineering "Second Edition.
3. Sankar, S.K. And Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.
4. Gahlot .P.S & Sanjay Sharma ,"Building repair and maintenance management "CBS Publications.2006

Suggested/Resources:

1. Robertwade Brown, "Practical Foundation Engineering Handbook", McGraw Hill Publications, 2005.
2. Patrick Powers .J, "Construction Dewatering: New Methods and Applications" John Wiley & Sons, 2002.
3. Micheal T.Kubal ,"Construction Waterproofing Handbook".

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Approved in Academic Council held on 28 July 2021

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Construction Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO1	3	2	3	2	1	2	2	1	3	3	1	3	**2.17**
CO2	3	2	3	3	3	2	x	x	3	2	x	3	**2.67**
CO3	2	2	2	2	1	2	3	2	2	2	2	3	**2.08**
CO4	2	2	3	2	1	2	2	1	2	1	2	2	**1.83**
CO5	2	1	2	2	3	2	2	1	3	2	3	2	**2.08**
Average	**2.4**	**1.8**	**2.6**	**2.2**	**1.8**	**2**	**2.25**	**1.25**	**2.6**	**2**	**2**	**2.6**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 28 July 2021

IQAC

Cryptography and Network Security

COURSE CODE: 18B1WCI734

COURSE CREDIT: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Introduction to Computers, Knowledge of Computer Networks

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To know about various encryption techniques.
3. To be able to secure a message over insecure channel by various means.
4. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
5. To understand various protocols for network security to protect against the threats in the networks.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic security services e.g.Authentication, Access Control, Confidentiality, Integrity, and Non repudiation).	Familiarity
CO-2	Learn standard symmetric encryption algorithms	Assessment
CO-3	Learn the architecture for public and private key cryptography and how public key infrastructure (PKI) supports network security.	Assessment
CO-4	Learn the methods of digital signature and encryption.	Assessment
CO-5	Learn key management and how key exchange protocols work.	Usage
CO-6	Learn futuristic cryptographic techniques like Eliptic Curve and quantum cryptography.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Block Symmetric Ciphers** Foundation of Security & Cryptography: OSI security architecture, Security Policy, Classical encryption techniques(Substitution Techniques, Transposition Techniques and Staganography) **Mathematical Tools for Cryptography:**	2

Assistant Registrar (Academics)
Jaypee University of Information Technology

IQA

	Finite fields, number theory,Design Principle of Block Ciphers:DES, Block Cipher Algorithms: AES,Pseudo Random Numbers & Stream Ciphers: Multiple Encryption, Block Cipher modes of operation, stream ciphers, Confidentiality	6
2	**Assyymmetric Ciphers** Public Key Cryptography: RSA, Key management,Hashes & Message Digest:Authentication functions,Message authentication codes,Hash functions and their security,Digital Signature, Certificates & standards,Authentication:X.509 Authentication service,	10
3	**Security Applications and Protocols** Electronic Mail Security:S/MIME, IP and Web Security Protocols:IPsec, Secure socket layer and transport layer security, secure e-transaction.	5
4	**System Security** System Security : Computer Virus, Firewall & Intrusion Detection , Trusted systems, Security Investigation/Audit, Cyber Laws: IT ACT 2000, IT amendment ACT 2008..	5
Total lectures		**28**

Suggested Text books:

1. "Cryptography & Network Security" by Stallings, William (Seventh Edition or later).

Other useful resources:

1. Virtual Labs: http://cse29-iiith.virtual-labs.ac.in/index.php?section=Experiments Students are advised to practice virtual lab experiments at above link as and when the topics are covered in the class.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Cryptography and Network Security)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	1	3	2	2	1	1	1	1	1	1	**1.6**
CO-2	3	2	1	2	2	3	1	3	3	1	2	3	**2.2**
CO-3	2	2	3	1	2	2	3	2	2	3	2	1	**2.1**
CO-4	2	3	3	3	2	3	2	3	2	1	2	1	**2.3**
CO-5	3	2	3	1	2	3	3	2	3	1	2	3	**2.3**
CO-6	3	2	1	1	2	2	2	3	2	1	1	1	**1.8**
Average	**2.7**	**2.2**	**2**	**1.8**	**2**	**2.5**	**2**	**2.3**	**2.2**	**1.3**	**1.7**	**1.7**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Cryptography and Network Security Lab

COURSE CODE: 18B1WCI774

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisites: Introduction to Computers, Knowledge of Computer Networks

Course Objectives:

1. Be exposed to the different cipher techniques
2. Learn to implement the algorithms like DES, RSA, MD5, SHA-1
3. Understand the Digital Signature Standard
4. Learn to use network security tools like GnuPG, KF sensor, Net Strumbler
5. Be familiar with the intrusion detection system

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Implement the cipher techniques	Usage
CO-2	Apply the mathematical foundation required for various cryptographic algorithms	Assessment
CO-3	Develop the various security algorithms	Assessment
CO-4	Design the signature scheme by applying Digital Signature Standard.	Assessment
CO-5	Use different open source tools for network security and analysis	Usage
CO-6	Demonstrate the intrusion detection system	Assessment

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

List of Experiments:

S.No	Description	Hours
1	Implementation of Substitution and Transposition Techniques a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vignere Cipher e) Rail Fence Cipher	3
2	Implementation of Cryptographic Algorithms a) DES-AES b) RSA Algorithm c) Diffie-Hellman Algorithm	3
3	Implementation of Cryptographic Algorithms d) MD5 e) SHA-1	2
4	Implement the SIGNATURE SCHEME - Digital Signature Standard(DSS/DSA)	3
5	Providing secure data storage, secure data transmission and creating digital signatures	2
6	Setup a Honey Pot and Monitor the Honeypot on Network	2
7	Installation of toolkits and study the variety of network security options	2
8	Perform wireless audit on an access point or a router and decrypt WEP and WPA(Net Stumbler)	2
9	Develop and Demonstrate intrusion detection system	3
10	Implement Electronic Mail Security:S/MIME	3
11	Implement IPSEC	4
Total Lab hours		28

Suggested Books/Resources:

1. "Cryptography & Network Security" by Stallings, William (Seventh Edition or later) will be used as the main text book, however the inputs will be supplemented with information from elsewhere wherever the same is required.
2. Virtual Labs: http://cse29-iiith.virtual-labs.ac.in/index.php?section=Experiments Students are advised to practice virtual lab experiments at above link as and when the topics are covered in the class.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	2	1	3	2	2	1	1	1	1	1	1	1.6
CO2	3	2	1	2	2	3	1	3	3	1	2	3	2.2
CO3	2	2	3	1	2	2	3	2	2	3	2	1	2.1
CO4	2	3	3	3	2	3	2	3	2	1	2	1	2.3
CO5	3	2	3	1	2	3	3	2	3	1	2	3	2.3
C06	2	2	2	1	2	2	2	3	2	1	1	1	1.8
Average	2.5	2.2	2.2	1.8	2	2.5	2	2.3	2.2	1.3	1.7	1.7	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Dams and Reservoir Design

COURSE CODE:18B1WCE736

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Water Resource Engineering, Geotechnical Engineering

Course Objectives:.

1. To introduce the students to the basic knowledge of dams and their appurtenances.
2. To develop an understanding regarding selection of a suitable dam for a particular site.
3. Impart knowledge about the construction, design and maintenance of various dams.
4. Train the students to analyze various dams to check their stability and safety.
5. To apply the principles of water resource and irrigation engineering and excel the students in the computation of the reservoir capacity which is indispensable for deciding the inundation area and demand pattern for any dam.
6. To enable the students to apply their knowledge of mechanics to calculate the critical stresses and various forces(static and dynamic) to ensure the proper design and stability of the dam.
7. To introduce the students to the various modern techniques and various challenges of dam construction by exposing them to real field conditions incorporating modern pedagogical methods of learning.
8. To train the students to use software tools for the modeling and analysis of various dams.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Select the suitable site for construction of different dams and suggest the type of dam required as per the topographical, functional, economical and ecological considerations.	Familiarity
CO-2	Know about the various components of a dam, their functions and types.	Familiarity
CO-3	Calculate the reservoir capacity based on demand (outflow) and supply (inflow) patterns.	Assessment/ Usage
CO-4	Calculate the forces and stresses coming on gravity and earthen dams due to static and dynamic forces prevalent in nature	Assessment
CO-5	Analyze the dam for its safety against various forms of failure and suggest the preventive measures.	Assessment/ Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

Data Compression

COURSE CODE: 18B1WCI532

COURSE CREDITS: 2

CORE/ELECTIVE: ELECTIVE

L-T-P: 2-0-0

Pre-requisites: Digital image processing, UG mathematics, vectors, basic programming skills

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques' case studies	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Definitions, Historical background, Applications, Taxonomy	1
2	Intuitive Compression: Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move-to Front Coding, Scalar Quantization	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	Statistical Methods Information: Theory Concepts, Variable-Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, Shannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic coding, Adaptive Arithmetic Coding, QM Coder, Text Compression, Context-Tree Weighting	4
4	Dictionary Methods: String Compression, Simple Dictionary Compression, LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1,LZRW 4, LZW, LZMW, LZAP, LZY, LZP, Repetition Finder, UNIX Compression, The V.42bis Protocol, XML Compression: XMill, EXE Compressors, CRC, Data Compression Patents	4
5	Image Compression: Approaches to Image Compression; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Simple Images: EIDAC, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context-Based Methods, FELICS, Progressive FELICS, Differential Lossless Compression	4
6	Wavelet Methods: Fourier Transform, The Frequency Domain, Fourier Image, Compression, Multiresolution Decomposition, The Laplacian Pyramid, SPIHT, CREW. EZW, DjVu, JPEG 2000	4
7	Video Compression: Analog Video , Composite and Components Video, Digital Video, Video Compression, MPEG, MPEG-4, H.261 Audio Compression: Sound, Digital Audio, The Human Auditory System , μ-Law and A-Law Companding, ADPCM Audio Compression, MLP Audio, Speech Compression, Shorten MPEG-1 Audio Layers	4
8	Other Methods and Application: Zip and Gzip, PNG, The Burrows-Wheeler Method, Symbol Ranking, ACB, SortBased Context Similarity, Sparse Strings, Word-Based Text Compression, Textual Image Compression, Dynamic Markov Coding, FHM Curve Compression, Sequitur, Triangle Mesh Compression: Unicode Compression	4
Total Lectures		28

Suggested Text Book(s):

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006

Suggested Reference Book(s):

1. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
2. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
3. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
4. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
2. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment		Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

ourse Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course Outcomes (Data Compression)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	1	1	3	2	3	3	3	3	1	2.4
CO-2	2	2	2	2	3	3	2	3	3	3	1	3	2.4
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.3	2.6	3	2.3	2.7	2.7	3	2.4	2.6	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Data Compression Lab

COURSE CODE: 18B1WCI574

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques' case studies	Familiarity

List of Experiments:

S. No	Description	Hours
1	Implementing a Huffman decoder	2
2	Implementing a Huffman encoder	2
3	Compressing a large file	2
4	Implementation of Run-Length Encoding	2
5	Implementation of RLE Text Compression	2

Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

6	Implementation of RLE Image Compression	2
7	Implementation of Move-toFront Coding	2
8	Implementation of Scalar Quantization	2
9	Implementing Variable-Size Codes	2
10	Implementing Prefix Codes	2
11	Implementing Golomb Codes	2
12	Implementing The Kraft-MacMillan Inequality	2
13	Implementing The Counting Argument	2
14	Implementing Shannon-Fano Coding	2
Total Lab hours		28

Minor Project(s) – (Only for 2 credit lab)

1. Image Compression using Filtering Techniques.
2. Image Decopression using Wavelets transform.
3. Compressing dehazed images using HE, Fattal method
4. Underwater Image compression using Wavelets and equalization
5. Underwater Panoramic Image compression using mosaicking techniques

Suggested Books/Resources:

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006
3. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
4. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
5. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
6. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.
7. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
8. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	Average
CO-1	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-2	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	1	2.5
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.4	2.7	3	2.3	2.7	2.7	3	2.4	2.6	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Data Compression Lab

COURSE CODE: 18B1WCI574

COURSE CREDITS: 1

CORE/ELECTIVE: ELECTIVE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. To provide students with contemporary knowledge in Data Compression and Coding.
2. To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
3. Analyze the operation of a range of commonly used Coding and Compression techniques
4. Identify the basic software and hardware tools used for data compression.
5. Identify what new trends and what new possibilities of data compression are available.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To understand the statistical basis for and performance metrics for lossless compression.	Familiarity
CO-2	To understand the conceptual basis for commonly used lossless compression techniques	Assessment
CO-3	To understand how to use and evaluate several readily available implementations of those techniques	Assessment
CO-4	To understand the structural basis for and performance metrics for commonly used lossy compression techniques	Assessment
CO-5	To understand the conceptual basis for commonly used lossy compression techniques	Assessment
CO-6	To implement graph theory in compression methodologies for images in MATLAB	Usage
CO-7	To understand image compression techniques' case studies	Familiarity

List of Experiments:

S. No	Description	Hours
1	Implementing a Huffman decoder	2
2	Implementing a Huffman encoder	2
3	Compressing a large file	2
4	Implementation of Run-Length Encoding	2
5	Implementation of RLE Text Compression	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

6	Implementation of RLE Image Compression	2
7	Implementation of Move-toFront Coding	2
8	Implementation of Scalar Quantization	2
9	Implementing Variable-Size Codes	2
10	Implementing Prefix Codes	2
11	Implementing Golomb Codes	2
12	Implementing The Kraft-MacMillan Inequality	2
13	Implementing The Counting Argument	2
14	Implementing Shannon-Fano Coding	2
Total Lab hours		28

Minor Project(s) – (Only for 2 credit lab)

1. Image Compression using Filtering Techniques.
2. Image Decopression using Wavelets transform.
3. Compressing dehazed images using HE, Fattal method
4. Underwater Image compression using Wavelets and equalization
5. Underwater Panoramic Image compression using mosaicking techniques

Suggested Books/Resources:

1. David Salomon , A Concise Introduction to Data Compression, 1st edition, Springer, 2008
2. Sayood, Khalid, Introduction to Data Compression, 3rd Edition, Morgan Kaufmann, 2006
3. David Salomon, G. Motta, D. Bryan, Data Compression: The Complete Reference, 4nd edition, Springer(2006)
4. D.C. Hankerson, Greg A. Harris , Peter D. Johnson Jr, Introduction to Information Theory and Data Compression, Second Edition, Chapman & Hall/CRC; 2 edition 2003
5. Anderson, J.B. and Mohan, S., Source and Channel Coding, Kluwer, 1991.
6. Gersho, A. and Gray, R.M., Vector Quantization and Signal Compression, Kluwer, 1992.
7. Link to NPTEL course contents: https://nptel.ac.in/courses/108104098/41
8. Link to topics related to course:
   i. https://london.ac.uk/sites/default/files/study-guides/data-compression.pdf
   ii. http://www.ws.binghamton.edu/fowler/fowler%20personal%20page/EE523.htm
   iii. http://www.nhu.edu.tw/~chun/CS-ch15-Data%20Compression.pdf
   iv. http://apachetechnology.in/ati/www/KC/dw/Saloman%20-%20Data_Compression_Complete_Reference.pdf

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	Average
CO-1	3	3	3	1	2	3	2	3	3	3	3	2	2.6
CO-2	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO-4	3	3	2	3	3	3	2	1	1	3	3	3	2.5
CO-5	3	3	3	1	2	3	2	3	3	3	3	1	2.5
CO-6	2	2	2	3	3	3	2	3	3	3	1	3	2.5
CO-7	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	2.7	2.7	2.6	2.4	2.7	3	2.3	2.7	2.7	3	2.4	2.6	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Data Science and Visualization Lab

COURSE CODE: 20B1WCI571
COURSE CREDITS: 1
CORE/ELECTIVE: ELECTIVE
L-T-P: 0-0-2

Pre-requisite: Python/ R Programming
Course Objectives:

- Asking the correct questions and analyzing the raw data.
- Modelling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and find the final result.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understanding the basics of data science	Familiarity
CO-2	Using versatile and flexible languages (Python and R programming) for supporting data science	Usage
CO-3	Using data processing for collecting and manipulating the data into a usable and desired form	Usage
CO-4	Using statistics to collect and analyze the numerical data in a large amount and finding meaningful insights from it	Usage
CO-5	Understanding linear algebra to represent, model, synthesize and summarize the complex data	Usage
CO-6	Using data visualization to easily access the huge amount of data in visuals	Usage

List of Experiments

S No	Description	Hours
1	• Write a Python/R program to create a vector of a specified type and length. Create a vector of numeric, complex, logical, and character types of length 6. • Write a Python/R program to add two vectors of integer type and length 3. • Write a Python/R program to create a list containing a vector, a matrix, and a list and remove the second element	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

<table>
<tr><td></td><td>

- Write a Python/R program to create a list containing a vector, a matrix, and a list and update the last element.

</td><td></td></tr>
<tr><td>2</td><td>

Write Python/R programs to solve the following tasks in both of them.

- Read numbers from a file and print them out in sorted order.
- Read a text file and count the total number of words.
- Read a text file and count the total number of distinct words.
- Read a file of numbers and plot a frequency histogram of them

</td><td>2</td></tr>
<tr><td>3</td><td>

Perform the data cleaning operations (using Python/R Programming) after creating the following data frame:

	Name	Height(meter)	Test Score
0	Alex	1.75	70.0
1	Mike	1.65	**NaN**
2	John	1.73	84.0
3	Dave	**NaN**	62.0
4	Joey	1.82	73.0

- Check for the status of null values in each column in the above data frame.
- Check for total number of missing values in each column of the above data frame.
- Fill in the missing values with '*'.
- Fill in the missing value for 'Test Score' column with '***'.
- Fill in the missing value for Test Score column with the average.
- Fill in the missing value for Test Score column with the average of the number above and below the missing value in the data frame.
- Delete the rows having missing values from the data frame.

</td><td>2</td></tr>
<tr><td>4</td><td>

Statistical Data Analysis

- In an entrance examination, there are twenty multiple-choice questions. Each question has four options, and only one of them is correct. Find the probability of having seven or less than seven correct answers if a student attempts to answer every question at random.
- Let us assume that the test scores an entrance exam fit a normal distribution where the mean test score is 67, and the standard deviation is 13.7. Calculate the percentage of students scoring 80 or more in the exam?

</td><td>2</td></tr>
<tr><td>5</td><td>

Statistical Data Analysis

Solve the linear regression for a given data set, and also predict sales in the year 2012.

Year	Sales
2005	12
2006	19
2007	29
2008	37

</td><td>2</td></tr>
</table>

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT • H.P.

		2009	45			
6	**Statistical Data Analysis** Compute Logistic Regression for Organization dataset. Response Variables Y = Compensation in rupees Prediction Variables X_1 = Experience in years X_2 = Education in years (after 10th standard) X_3 = Number of Employees Supervised X_4 = Number of Projects Handled Here you will get an error as y- value must be 0 < 1. So modify Y values.					2

S No	Compensation	Experience	Education	Number supervised	Projects
1	1500	2	5	4	10
2	1650	3	6	5	10
3	1750	3	3	5	12
4	1400	2	3	3	9
5	2000	4	4	6	15
6	2200	5	6	6	14
7	2100	1	5	4	12
8	2750	5	8	7	15
9	2900	8	9	8	25
10	1100	3	3	2	7
11	1000	4	2	1	5
12	1350	6	4	4	12
13	1550	4	6	4	11

	Mid-Semester Lab Examination	2
7	**Linear Algebra** Compare the speed of a library function for matrix multiplication to your implementation of the nested loops algorithm. • How much faster is the library on products of random $n \times n$ matrices, as a function of n as n gets large? • What about the product of an $n \times m$ and $m \times n$ matrix, where $n \times m$? • By how much do you improve the performance of your implementation to calculate $C = A \times B$ by first transposing B internally, so all dot products are computed along rows of the matrices to improve cache performance?	2
8	**Linear Algebra** Implement Gaussian elimination for solving systems of equations, $C \times X = Y$. Compare your implementation against a popular library routine for: • Speed: How does the run time compare, for both dense and sparse coefficient matrices? • Accuracy: What is the size of the numerical residuals $CX - Y$, particularly as the condition number of the matrix increases. • Stability: Does your program crash on a singular matrix? What about almost singular matrices, created by adding a little random noise to a singular matrix?	2
9	**Data Visualization**	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

	Construct a revealing visualization of some aspect of your favorite data set, using: • A well-designed table. • A dot and/or line plot. • A scatter plot. • A heatmap. • A bar plot or pie chart. • A histogram. • A data map.	
10	**Data Visualization** Create ten different versions of line charts for a particular set of (x, y) points. Which ones are best and which ones worst? Explain why.	**2**
11	**Data Visualization** Construct scatter plots for sets of 10, 100, 1000, and 10,000 points. Experiment with the point size to find the most revealing value for each data set.	**2**
12	**Data Visualization** Experiment with different color scales to construct scatter plots for a particular set of (x, y, z) points, where color is used to represent the z dimension. Which color schemes work best? Which are the worst? Explain why.	**2**
End-Semester Lab Examination		**2**
Total Lab hours		**28**

Suggested Text Books:

- Python Data Science Hand Book Jake VanderPlas
- Mastering Python for Data Science - by Samir Madhavan.
- R Programming for Data Science by Roger D. Peng

Reference Books:

- Python Data Science: Hands-on Learning for Beginners Kindle Edition by Travis Booth (Author)
- Data Science with R: A Step By Step Guide with Visual Illustrations & Examples by Andrew Oleksy
- R for Data Science: Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham (Author), Garrett Grolemund

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Project-1	10 Marks
4	Lab Assessment	45 Marks
5	Lab Attendance	5 Marks
	Total	100 marks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Data Science and Visualization Lab)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	1	1	1	3	2	2	1	1.8
CO-2	3	3	3	3	3	1	1	2	2	2	1	1	2.1
CO-3	2	2	2	2	1	1	2	2	2	2	1	2	1.8
CO-4	3	3	3	3	2	1	1	3	2	3	3	2	2.4
CO-5	3	2	3	3	1	1	2	1	1	3	2	1	1.9
CO-6	2	2	1	2	2	2	3	2	1	2	3	1	1.9
Average	2.5	2.3	2.3	2.7	1.8	1.2	1.7	1.8	1.8	2.3	2	1.3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Environmental Management and Impact Assessment

COURSE CODE:18B1WCE732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn the basic objectives necessary to conduct EIA.
2. Learn the various national and international regulations and acts pertaining to EIA.
3. Learn the steps and methodologies involved in conducting EIA for different projects and environments.
4. Understand and predict the impacts of different activities on several environmental factors.
5. Understand the concept of risk management.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Recognize the need for EIA of potential projects.	Familiarity
CO-2	Demonstrate familiarity with regulations pertaining to EIA.	Assessment
CO-3	Demonstrate the use of methodologies in assessment of impacts of potential projects.	Assessment
CO-4	Comprehend risk management	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Environmental Impact Assessment**: Definition of Environmental Impact Assessment(EIA), Environmental Assessment(EA) and Environmental Impact Statement(EIS); National Environmental Policy Act (NEPA); National Goals of Environmental Policy; Council on Environmental Quality (CEQ); Draft, Supplemental and Final EIS; Environmental Inventory; Objectives of EIA	8
2	**EIA in India:** Administrative arrangements of EIA in India; Impact Assessment Agency(IAA) in MOEF-CC, GOI, India; Expert committee for administering EIA; Screening and Scoping; Requirements of prior environmental clearance; SEIAA; Category A	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Approved in Academic Council held on 25.10.2018

	and Category B projects.	
3	**EIA Methodologies**: Interaction matrices, Checklists, Networks, Adhoc Procedures, Overlay techniques; Simple interaction matrix and Stepped matrix; Application of various methodologies	6
4	**Environmental Indicators and Indices:** Definition of Environmental Indicator and Environmental Index; Biological Indicators; Procedures involved in calculation of Air Quality Index (AQI), Water Quality Index(WQI)and Noise Index; Similarity and Diversity Index	6
5	**EIA Study – Air Environment:** Definition of Air Pollution; Projects which contribute to air pollution; Basic steps for prediction and assessment of air pollution **Water Environment**: Basic Steps; Spatial and Temporal Phases; Operational Impacts of alternatives **Biological Environment:** Basic Steps **Cultural Environment:** Basic Steps	6
6	**Planning and Management of Impact Studies:** Conceptual Approach; Proposal Development; Interdisciplinary Team Formation; Team Leader Selection; General Study Management; Fiscal Control	6
7	**Risk Assessment**: Definition of Risk according to EPA; Risk Management; Human Health Risk Assessments; Ecological Risk Assessments	2
Total lectures		42

Suggested Text Book(s):

1. Larry W Canter: Environmental Impact Assessment, Mc Graw Hill Publishers.
2. Anjaneyulu, Y and Valli Manickam: Environmental Impact Assessment Methodologies, 2nd Edition, BS Publications, 2007.

Suggested Reference Book(s):

1. Peter Wathern, "Environmental Impact Assessment: Theory and Practice ", Routledge, 1998

Other useful resource(s):

1. Link to NPTEL course contents:www.epa.gov/risk

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(1) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Environmental Management and Impact Assessment)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.75
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2.00
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.75
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.08
Average	2	2.5	2.5	2.5	2.5	1	1	1	2	2.25	1.5	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Approved in Academic Council held on 25.10.2018

IQAC

DESIGN OF DEPENDABLE SYSTEMS

(ELECTIVE SUBJECT)

Objective:

The course gives a broad introduction to the design and quantitative evaluation of dependability in systems based on information and communication technologies.

Course Description:

Unit-1: Introduction to Dependability attributes: availability, reliability, safety, QoS; SLA

Unit-2: Dependability Analysis: The failure process, failure semantics, fault handling and maintenance; Models (Failure rate, Probability distributions) Series/Parallel Systems Markov Models.

Unit-3: Methods for dependability modeling and analysis: block diagrams and state diagrams (Discrete state continuous time Markov models); Fault Trees FMEA/FMECA/FMEDA Fault Injection. Modeling of software failure, prediction of software failure rates, impact of software failures on systems behavior;

Unit-4: Design of Dependability: Fault tolerance, types of redundancy, design principles and mechanisms, the properties of designs; Fault Detection, Tolerance and Recovery, Lifetime improvement.

Unit-5: Prediction of hardware failure rates: software, hardware and architectural approaches space, information and time redundancy Design for Testability Data/Model-driven approaches Diagnosis.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Unit-6: Survivability of networks, dependability evaluation of networks taking the traffic carrying (QoS) requirements into account. Some applications of dependability in IT related services.

References:

1. J. C. Laprie, Dependability: Basic Concepts and Terminology : (DEPENDABLE COMPUTING AND FAULT-TOLERANT SYSTEMS), Publisher: Springer Verlag
2. Dhiraj K. Pradhan, Fault-tolerant computer system design, Prentice-Hall, 1996.
3. M.L. Shooman, Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design, Wiley, 2002

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Finite Element Method

COURSE CODE: 18B1WCE737

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of structural analysis, conventional approaches to analyse a structure, and matrix method.

Course Objectives:

1. To learn basic concept of finite element method.
2. To learn how it is used in different software's and in different field of engineering.
3. To apply FEM in different civil engineering problems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic aspects of finite element methods, engineering problem solution formulation, discretization, and type of elements along with theirapplication.	Familiarity
CO-2	Develop an engineering solution for 1-D (spring) element using finite element approaches and application of these methods on spring assemblage.	Assessment
CO-3	Develop an engineering solution for axial (truss) element and truss assemblage using finite element approaches in linear, plane and space coordinate system.	Assessment
CO-4	Develop an engineering solution for flexural (beam) element and assemblage using finite element approaches in linear, plane and space coordinate system with and without axial extensibility.	Usage
CO-5	Understand the basic characteristic of constant stress/strain element and able to apply in general civil engineeringproblems.	Usage

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Brief History, Application of FEM (Structural and Non-structural), Advantages and Disadvantages of FEM, Matrix Theory and Notations, Vector Analysis, Coordinate System, Classification of 1-D, 2-D, and 3-D Elements, Shape Function, Discretization, Degree of Freedom, Force/Displacement Analysis. General Steps Involvedin FE Analysis (in Detail)	8
2	**Spring Element and Spring Assembly:** Development of a Spring Stiffness Matrix, Development of Spring Assembly by Direct Equilibrium Method, Work/Energy Method, Methods of Weighted Residuals- Galerkin's Method, and Variational Method, Development of Force-Displacement Relation, Strain-Displacement Relation, Calculation of Elemental Reaction Force and Nodal Displacement.	8
3	**Axial Element and Assembly:** Development of Bar Element Stiffness Matrix, Vector Transformation in Different Coordinate System, Displacement Transformation, Displacement Transformation Matrix for 1, 2, and 3-Dimensional Coordinate System, Generation of global stiffness matrix for an Element and Assembly, Computation of Stress in an Element, Use of Similar Methods to Develop Elemental Equations. Comparison of FEM solution with Exact Solution (Standard Examples).	9
4	**Flexural Element and Assembly:** Development of Differential Equation for Beam Element, Selection of Displacement Function, Development of Element Stiffness Matrix, Stiffness Matrix Assemblage, Application of Boundary Conditions, Evaluation of Response Under Different Kind of Loading, use of similar Methods to Develop Elemental Equations. Comparison of FEM solution with Exact Solution (Standard Examples).	8
5	**Linear and Plane Strain/Stress Analysis:** Linear Element Analysis, Development of Constant Strain Triangular (CST) Element, Plane Stress and Plane Strain Equation, Application of Constant Stress and Strain in Civil Engineering.	6
6	**Two Dimensional Elements:** Introduction to Axisymmetric and Isoparametric Elements and Applications.	4
7	**Commercial Packages:** ABAQUS, ANSYS, NISA, SAP2000 etc. extensibility	1
Total lectures		42

Suggested Text Book(s):

1. Kalus Jurgen Bathe, Finite Element Procedures, PHI Learning PrivateLimited.
2. J. N. Reddy, An Introduction to the Finite Element Method, McGraw HillEducation.
3. P. Seshu, Textbook of Finite Element Analysis, PHI Learning PrivateLimited.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Other useful resource(s):

1. https://nptel.ac.in/courses/105105041/
2. https://nptel.ac.in/courses/105106051/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2)-10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Finite Element Method and Its Applications to Civil Engineering)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2.0	1.0	2.0	1.0	2.0	3.0	2.0	3.0	3.0	2.0	2.0	2.0	**2.0**
CO-2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	2.0	2.0	2.0	**2.0**
CO-3	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	1.0	3.0	**3.0**
CO-4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	3.0	**3.0**
CO-5	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	3.0	**3.0**
Average	**2.6**	**2.4**	**2.4**	**2.2**	**2.6**	**2.8**	**2.6**	**3.0**	**3.0**	**2.0**	**1.8**	**2.6**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Food Nutrition & Health Care

COURSE CODE: XXXXXXX

COURSE CREDITS: 3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To provide basic understanding of the food, nutrition, life style diseases, drug abuse and rehabilitation

Course Outcomes

S.No	Course Outcome	Level of Attainment
CO I	To understand the basics of nutrition, energy balance and essential nutrients.	Familiarity
CO II	To understand the nutritive and functional value of food products	Familiarity & Usage
CO III	To understand the basics of stress, life style diseases and its management	Familiarity & Usage
CO IV	To understand the basic concepts of addiction and rehabilitation	Familiarity & Usage

Course Contents:

Unit	Content	Contact Hrs.
1	Introduction to nutrition – energy requirements and energy balance, essential nutrients, my plate	2
2	Nutrition for a healthy person – micronutrients: vitamins, minerals and the indications for the use of nutritional supplements. macronutrients: basic concepts Ncbi bookshelf- https://www.ncbi.nlm.nih.gov/books/NBK218743/?term=diet%20and%20nutrition https://www.ncbi.nlm.nih.gov/books/NBK554545/	3
3	Carbohydrates, glycemic index, metabolic implications of fructose, dietary fibre, protein.	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2714385/#fn1 https://www.hsph.harvard.edu/nutritionsource/carbohydrates/carbohydrates-and-blood-sugar/ https://www.health.harvard.edu/diseases-and-conditions/glycemic-index-and-glycemic-load-for-100-foods https://nutritionandmetabolism.biomedcentral.com/articles/10.1186/1743-7075-2-5	
4	Saturated fat, unsaturated fat, trans fat, omega 3/omega 6.	2
5	micronutrients: vitamins, minerals and nutritional supplements Vitamins: vitamin A, D, B, antioxidants – C, E, beta-carotene and others Minerals: iron and calcium https://www.ncbi.nlm.nih.gov/books/NBK554545/	5
6	**Consumption of fast food, snack foods, sugary beverages and fructose, and impairment in the regulation of food consumption. Distribution of fat - the difference between visceral and subcutaneous fat** Fat distribution https://pediaa.com/what-is-the-difference-between-visceral-and-subcutaneous-fat/ https://academic.oup.com/edrv/article/21/6/697/2424212	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

7	Introduction to health supplements & protein diet, its pros and cons	3
8	Introduction to health psychology and life style diseases	2
9	The nature of stress, life events & social stressors, depression and suicidal intentions https://www.nimh.nih.gov/health/publications/stress https://www.nimh.nih.gov/health/topics/depression	3
10	Obesity, diabetes, diet/nutrition and its management https://www.mayoclinic.org/diseases-conditions/diabetes/symptoms-causes/syc-20371444	3
11	Short term and long term effects of excessive alcohol use https://www.niaaa.nih.gov/alcohols-effects-health/alcohols-effects-body https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/treatment-alcohol-problems-finding-and-getting-help	2
12	Medication and side effects of androstenedione, anabolic steroids, creatine monohydrate, etc.	4
13	Fundamental concepts, properties and effects of psychoactive substances.	3
14	Knowledge of the continue of drug use: such as initiation, intoxication, harmful use, abuse, dependence, withdrawal carving, relapse and recovery https://www.drugabuse.g	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	ov/drug-topics/commonly-used-drugs-charts	
	TOTAL	42

Suggested Text Books/References:

1. Krause's Food & the Nutrition Care Process,14th Edition by L. Kathleen Mahan, MS, RD, CDE and Janice L Raymond, MS, RD, CD
2. SrilakshmiB(2017): Nutrition Science,6th Multicolour Ed. New Age International (P) Ltd
3. Mann J and TruswellS(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University Press.
4. SwaminathanM(2007): Essentials of Food and Nutrition(Vol. I & II), 2nd Ed. Bappco
5. GopalanC , Rama Sastri BV and Balasubramanian SC(2016): Nutritive value of Indian Foods, Indian Council of Medical Research
6. Zimmermann M(2001):Burgerstein's Handbook of Nutrition: Micronutients in the Prevention and Therapy of Disease Thieme Stuttgart
7. MudambiSR(2018): Fundamentals of Foods, Nutrition and Diet Therapy, 6th Ed. New Age International (P) Ltd.
8. PruthiJS(2011):Spices and Condiments, National Book trust, New Delhi.
9. Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers
10. Department of Health (Alcohol and Drug Abuse Division). (2013). Twelve core functions of the alcohol and other drug abuse counselor. Honolulu, Hawaii: DOH. Retrieved from: http://health.hawaii.gov/substance-abuse/files/2013/05/csac-corefunctions1.pdf
11. *Drugs, Society, and Human Behavior* Ksir, C., Hart, C., & Ray, O.McGraw-Hill, 14th Edition, 2010
12. https://www.drugabuse.gov/sites/default/files/soa_2014.pdf
13. https://ed.ted.com/on/Hm9X3Yrt
14. https://www.framingham.edu/Assets/uploads/academics/continuing-education/professional-development/documents/syllabi/prdv-71527.pdf

Course Assessment:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Forensic Image Processing

COURSE CODE: 19B1WEC735

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Prerequisite: Fundamentals of Digital Image Processing

Course Objectives:

1. To aware the students about the role of image processing for forensic investigations.
2. To introduce different attributes of the image source that helps in the identification of the source of the image.
3. To make students understand the role of watermarking, cryptography and other methods used for forensic investigation.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the requirement of image processing in Image processing	Familiarity
CO-2	Understand the working of digital image capturing devices and parameters related to the devices.	Usage
CO-3	Understand the attributes of the image source for forensic investigation.	Usage
CO-4	Able to implement watermarking and cryptography methods on images.	Assessment
CO5	Able to compare the two images and identify the content present in them.	Assessment

Course Contents:

Unit	Contents	Lectures required
1.	Forensic image analysis: A Framework and its applications (Example of Police cases solved with forensic image processing)	3
2.	Digital Still and Video Cameras: Dynamic Range, Light and Lenses, Setting exposure, Resolution, File format and compressions, JPEG and MPEG compression	7
3.	Image Enhancement and Restoration: Color Spaces, Color Correction, Interpolation, Convolutions, Enhancement Filters, Morphological Filters,	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Sharpening Contrast	
4.	Techniques attributing an image to its source: Image and Video source class identification, Sensor defects in digital image forensic	8
5.	Detecting doctored images: Digital Watermarking and cryptography	8
6.	Photo Image Comparison, Image Content Analysis, Image Authentication	8
Total lectures		42

Suggested Text Book(s):

1. Sencar, Husrev Taha, Memon, Nasir (Eds.), "Digital Image Forensics: There is More to a Picture than Meets the Eye", Springer, 2012.

Suggested Reference Book(s):

1. Anthony T. S. Ho, Shujun Li, "Handbook of Digital Forensics of Multimedia Data and Devices", Wiley 2016.
2. Ahmed Bouridane, "Imaging for Forensics and Security", Springer, 2009

Other useful resource(s):

1. Judith A. Redi, Wiem Taktak & Jean-Luc Dugelay, "Digital image forensics: a booklet for beginners", Multimedia Tools and Applications volume 51, pages133–162, 2011.
2. NPTEL online course: https://www.youtube.com/watch?v=O2RwWHWHQlM

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	2	3	2	2	2	2	2	x	x	2	2	2	2.1
CO2	2	3	2	2	2	2	2	x	x	2	2	2	2.1
CO3	3	3	3	3	3	2	2	x	3	2	2	2	2.54
CO4	3	3	3	3	3	2	2	x	3	2	2	2	2.54
CO5	3	3	3	3	3	2	2	x	3	2	2	2	2.54
Average	2.6	3	2.6	2.6	2.6	2	2	x	3	2	2	2	

Assistant Professor (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Foundation for Data Science and Visualization

COURSE CODE: 20B1WCI531
COURSE CREDITS: 2
CORE/ELECTIVE: ELECTIVE
L-T-P: 2-0-0

Pre-requisite: Basic knowledge of high school mathematics and reasonable programming experience.

Course Objectives:

- Asking the correct questions and analyzing the raw data.
- Modeling the data using various complex and efficient algorithms.
- Visualizing the data to get a better perspective.
- Understanding the data to make better decisions and find the final result.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Understanding the basics of data science	Familiarity
CO-2	Using versatile and flexible languages (Python and R programming) for supporting data science	Usage
CO-3	Using data processing for collecting and manipulating the data into the usable and desired form	Usage
CO-4	Using data visualization to easily access the huge amount of data in visuals	Usage
CO-5	Using statistics to collect and analyze the numerical data in a large amount and finding meaningful insights	Usage
CO-6	Understanding linear algebra to represent, model, synthesize and summarize the complex data. Understanding Linear and Logistic regression, machine learning algorithms	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Data Science an Introduction:** Computer Science, Data Science, and Real Science, What is Data Science? Need for Data Science, Data Science Components, Tools for Data Science, Data Science Lifecycle, Applications of Data Science	2
2	**Python and R Programming for Data Science for Data Science:** Introduction to Python Programming (Python Basics, Python Data Structures, Python Programming Fundamentals, Working with Data in Python, Working with NumPy, Pandas, SciPy, and Matplotlib). Introduction to R Programming (R basics, Data structures in R, R Programming fundamentals, Working with Data in R, Stings, and Dates in	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

	R, Discover R's packages to do graphics)	
3	**Data Processing:** Data Operations, Data cleansing, Processing CSV Data, Processing JSON Data, Processing XLS Data, Relational databases, NoSQL Databases, Date and Time, Data Wrangling, Data Aggregation, Reading HTML Pages, Processing Unstructured Data, Word tokenization, Stemming and Lemmatization	4
4	**Data Visualization**: Exploratory Data Analysis. Visualization tools, Types of Charts	5
5	**Statistical Data Analysis:** Measuring Central Tendency, Measuring Variance, Normal Distribution, Binomial Distribution, Poisson Distribution, Bernoulli Distribution, P-Value, Correlation, Chi-square Test, Linear Regression	5
6	**Linear Algebra:** Visualizing Matrix Operations (Matrix Addition, Matrix Multiplication, Applications of Matrix Multiplication, Identity Matrices and Inversion, Matrix Inversion and Linear Systems, Matrix Rank) Factoring Matrices (Why Factor Feature Matrices, LU Decomposition, and Determinants), Eigenvalues and Eigenvectors (Properties of Eigenvalues, Computing Eigenvalues), Eigenvalue Decomposition (Singular Value Decomposition, Principal Components Analysis). **Linear and Logistics regression**: Understanding Linear and Logistic regression. **Machine Learning Algorithms:** Understanding machine learning algorithms	7
	Total Lecture Hours	**28**

Suggested Text Book(s):

- The Data Science Design Manual, Steven S. Skiena, Springer
- Data Science from Scratch by JoelGrus
- Data Science for Dummies by Lillian Pierson and Jake Porway
- An Introduction to Statistical Learning by Gareth James, Daniela Witten, et al.

Reference Book(s):

- An Introduction to Probability and Statistics by V.K. Rohatgi& A.K. Md. E. Saleh, Wiley, (2008), 3rd ed.
- Introduction to Probability Theory and Statistical Inference by H.J. Larson, John Wiley & Sons, (2005) 3rd ed.

Other useful resources (s):

- https://nptel.ac.in/courses/110/106/110106064/
- https://onlinecourses.nptel.ac.in/noc18_cs28/prev iew

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Foundation for Data Science and Visualization)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	3	2	1	1	1	3	2	2	1	1.8
CO-2	3	3	3	3	3	1	1	2	2	2	1	1	2.1
CO-3	2	2	2	2	1	1	2	2	2	2	1	2	1.8
CO-4	3	3	3	3	2	1	1	3	2	3	3	2	2.4
CO-5	3	2	3	3	1	1	2	1	1	3	2	1	1.9
CO-6	2	2	1	2	2	2	3	2	1	2	3	1	1.9
Average	2.5	2.3	2.3	2.7	1.8	1.2	1.7	1.8	1.8	2.3	2	1.3	2.0

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Fundamentals of Digital Image Processing

COURSE CODE: 18B1WEC536

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms for basic and advanced image analysis
3. Assess the performance of image processing algorithms and systems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Analyze general terminology of digital image processing.	Familiarity
CO-2	Examine various types of images, intensity transformations and spatial filtering.	Familiarity
CO-3	Develop Fourier transform for image processing in frequency domain.	Assessment
CO-4	Evaluate the methodologies for image segmentation, restoration etc.	Usage
CO-5	Implement image process and analysis algorithms.	Usage
CO-6	Apply image processing algorithms in practical applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Digital Image Fundamentals: Introduction, Image sensing and acquisition, Image Sampling and quantization, Spatial and Gray level resolution, Zooming and Shrinking, Relationships between pixels, Linear and Nonlinear operations.	7
2	Image Enhancement in the Spatial Domain: Gray Level Transformation, Histogram Processing Techniques, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters.	8
3	Image Enhancement in the Frequency Domain: Properties of frequency domain, two dimensional Fourier Transform and its properties, Correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	6
4	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	6
5	Image Compression: Fundamentals of image compression, Image compression models, Variable length coding, Huffman coding, Near optimal variable length coding, Arithmetic coding, Constant area coding, Run length coding, Image compression standards (JPEG, JPEG2000).	7
6	Image Segmentation: Detection of discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation.	8
Total lectures		42

Suggested Text Book(s):

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", fourth Edition, Pearson Education, 2018.

Suggested Reference Book(s):

1. Anil K. Jain, "Fundamentals of Digital Image Processing", First Edition, PHI Learning Pvt. Ltd, 2015.

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2. Willliam K Pratt, "Digital Image Processing", Fourth Edition, John Willey, 2007.
3. S.Sridhar, "Digital Image Processing", Second Edition, Oxford University Press, 2016
4. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Fundamentals of Digital Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	1	1	2	2	2	2	1.92
CO-2	3	3	3	3	3	1	1	1	2	2	1	2	1.08
CO-3	3	2	2	2	3	2	1	1	2	2	1	2	1.92
CO-4	3	3	3	3	2	1	1	1	2	3	2	2	2.17
CO-5	3	3	2	3	2	2	2	2	2	3	3	2	2.42
CO-6	3	2	3	3	2	2	2	1	2	2	3	2	2.00
Average	3.00	2.50	2.50	2.67	2.3	1.67	1.33	1.17	2.00	2.33	2.00	2.00	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Fundamentals of Digital Image Processing and Applications

COURSE CODE: 20B1WEC533

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

: 3-0-0

Pre-requisite:

Course Objectives:

1. **Describe and explain basic principles of digital imageprocessing.**
2. Design and implement algorithms that perform basic image processing.
3. Design and implement algorithms for advanced image analysis.
4. Assess the performance of image processing algorithms andsystems.

Course Outcomes

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to

S. No.	Course Outcomes	Level of Attainment
CO-1	Analyze general terminology of digital image processing.	Familiarity
CO-2	Examine various types of images, intensity transformations and spatial filtering.	Usage
CO-3	Evaluate the methodologies for image segmentation, restoration etc.	Usage
CO-4	Understand different types of medical imaging modalities and would be able to differentiate them with respect to their advantages and limitations.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Digital Image Fundamentals: Fundamental steps in DIP, Components of digital image processing, elements of visual perception, Structure of the human eye, Image formation in the eye, Brightness adaptation and discrimination, light, Image sensing and acquisition, image formation model, definition and some properties of two dimensional system, Discrete 2D convolution, 2D discrete Fourier transform and its properties, optical and modulation transfer function, Spectral density function. Sampling and quantization of images, Two dimensional sampling theory, representation of digital image, Spatial and gray level resolution, zooming and shrinking, some basic relationships between pixels.	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	Image Enhancement in the Spatial Domain: Gray Level Transformations, Piecewise linear transformation, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filters, Use of first order and second order derivative in enhancement.	7
3	Image Enhancement in the Frequency Domain: Two dimensional Fourier Transform, properties of frequency domain, correspondence between filtering in spatial and frequency domain, Smoothing and Sharpening frequency domain filters, Homomorphic Filtering.	7
4	Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Noise reduction in spatial domain and frequency domain, Inverse filtering, Wiener filtering.	7
5	Image Segmentation: Detection of Discontinuities (point, line edge), Edge Linking and Boundary Detection, Thresholding, Basic global Thresholding, Adaptive Thresholding, Region-Based Segmentation, region growing, splitting and merging.	7
6	Application of Image Processing In Medical Field: Working principle, applications and limitations of different medical imaging modalities. Types of texture parameters: Statistical analysis of texture (First order statistics and Second order statistics), Grey level co-occurrence matrix, grey-level run length matrix.	7
Total lectures		42

Text Books

1. R.C.Gonzalas and R.E.Woods, Digital Image Processing, Prentice Hall, 3rd Ed.
2. Rangaraj M. Rangayyan: Biomedical Image Analysis, 1st Ed., CRC Press, New York , 2004.

Reference Books

1. A.K.Jain, Fundamentals of Digital Image Processing, PrenticeHall.
2. S.Sridhar, Digital Image Processing, Oxford UniversityPress.

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Fundamentals of Digital Image Processing & Applications)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	2	3	1	2	1	2	2.42
CO-2	3	3	3	3	2	0	0	1	2	3	1	1	1.83
CO-3	3	3	3	3	3	1	1	1	1	2	1	1	1.92
CO-4	3	3	3	3	3	3	2	3	2	2	3	3	2.75
Average	3.00	3.00	3.00	3.00	2.75	1.75	1.25	2.00	1.50	2.25	1.50	1.75	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

Image Sensing and Reconstruction

COURSE CODE: 20B1WEC736

COURSE CREDITS: 3

CORE/ELECTIVE: OPEN ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Prerequisites are good programming skills, basic theory of signals and systems, signal processing and some university level mathematics.

Course Objectives:

1. To understand the basic concepts of image formation, filtering and reconstruction.
2. To study various mathematical algorithms that allow usto process and manipulate 2D image data.
3. To discuss the issues and challenges pertaining to real timeimaging.
4. To study and analyze various states - of - the - art imageenhancement algorithms.
5. Study of application domains: industrial and scientific imaging.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Analyze the need and foundation of digital image sensing and reconstruction	Familiarity
CO-2	Study of the mathematical algorithms for filtering the image data	Assessment
CO-3	Analysis of problemsand approaches in real time image processing.	Assessment
CO-4	Study of application domains.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Fundamentals of Image Sensing:** Accessing Image Data, Image Types, Conceptualizing Images, Human Visual System, Simplified Imaging Model, Image Sampling and Quantization. CCD and CMOS Sensors.	8
2	**Image Transformations:**Gray Level Transformations, Image Histogram and Processing, Multispectral Transformations, Multi – Image Transformations, Image Interpolation and Warping.	8
3	**Spatial Domain Filtering:** Point Processing, Neighborhood Processing, 2D Convolution, Image Smoothing, Computation of First Derivative and Second Derivative, Non – Linear Filters, Gray Scale Morphological Operators.	7
4	**Frequency Domain Filtering:** Fourier Transform and Discrete Fourier Transform (DFT), Two Dimensional DFT, Low Pass filtering, High Pass Filtering, Band Pass Filtering, Homomorphic Filtering, Short Time	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

	Fourier Transform, Discrete Wavelet Transform.	
5	**Image Segmentation and Compression Techniques:** Edge Detection, Local and Global Thresholding, Adaptive Thresholding, Geometrical Processing, Watershed Algorithm, Basic Image Compression, Lossless and Lossy Compression, Image Compression Models.	6
6	**Applications of Image Sensing and Reconstruction:** Image Detection, Recognition and Verification, CNN for Image Recognition, Pattern Recognition and Motional Tracking, Real Time Imaging.	6
Total lectures		**42**

Suggested Text Book(s):

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing,Third Edition, Pearson Prentice Hall, 2008
2. Stan Birchfield, Image Processing and Analysis, CengageLearning India Private Limited, 2018

Suggested Reference Book(s):

1. D. K. Theckadath, Digital Image Processing using MATLABCoding, Third Edition, Tech - Max Publications, 2010.
2. A. K. Jain, Fundamentals of Digital Image Processing, Prentice – Hall, 1989.

Other useful resource(s):

Link to topics related tocourse:

i. https://nptel.ac.in/courses/digital image processing
ii. www.tutorialspoint.com/digital image processing

EvaluationScheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)

Course outcomes (Image Sensing and Reconstruction)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-1	2	2	3	3	2	1	1	1	2	2	2	2	2
CO-2	2	3	3	3	2	1	1	1	2	2	1	2	2
CO-3	2	3	3	3	2	1	1	1	2	2	1	2	2
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2
Average	**2**	**3**	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**2**	**3**	**2**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Industrial Enzymes Technologies

COURSE CODE: 18B1WBT733

COURSE CREDITS: 3

ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Enzyme production purification and applications

Course Objectives:

The objective of the course is to develop an understanding of important aspects of production and purification of industrially important enzyme and their application in industry.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To develop an understanding of basic concepts of enzymes.	Familiarity
CO-2	To understand the basic mechanism of action and working behavior of enzymes	Assessment
CO-3	To familiarize the students with various applications of enzymes in laboratory as well as Industrial scale.	Assessment
CO-4	To conceptualize about immobilized enzyme technology, and other specific enzymes and their applications.	Usage
CO-5	To familiarize the students with present potential of enzyme in industrial application and improved activity of the enzyme using various molecular biology techniques.	Usage
CO-6	To understand the principle and function of enzyme in various adverse conditions like high temperature and pH(s).	Assessment

S. No.	Unit	Topics Covered	Contact Hrs.
1	**Enzymes: Basic concepts**	Enzymes as powerful and highly specific catalysts, Classification of enzymes, free energy and enzymes, the formation of the transition state, catalytic strategies. General properties: Enzyme specificity, stability and structure, Factors affecting enzyme activity; effect of pH and Temperature, Substrate and Enzyme concentration.	5
	Enzyme Kinetics	Enzyme kinetics: Michaelis-Menten kinetics, evaluation of parameters in the Michaelis-Menten equation, 3-D structure of active site, Kinetics of single and bi-substrate enzyme catalysed reactions, Inhibition & its kinetics.	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Enzymes: Production and purification**	Enzyme preparation techniques: Sources of enzymes, production, Recovery and purification of intracellular products: cell disruption, chromatographic techniques. Analytical assays of purity level of enzymes.	3
3	**Enzyme preparation and application in industries**	Application of enzymes in leather, glucose syrup production, starch and sugar industry, Dairy and food industry, Beverage industry, Textile industry. Hydrolysis of starch and cellulose. Catalytic functions of Cellulase, lipase, esterase laccase amylase, glucose isomerase, protease, xylanase, invertase, peroxidises. Other applications of enzymes in solution: medical applications of enzymes, non-hydrolytic enzymes in current and developing industrial technology.	10
4	**Enzymes: engineering and improved properties**	Enzyme engineering: Mechanisms and manifestations of protein denaturation. Strategies for enzyme stabilization: Physical and chemical modifications, Selection, directed evolution and Rational design. design and construction of mutant enzymes, Bifunctional and polyfunctional enzyme, Enzyme in organic solvents.	5
5	**Immobilized-enzyme technology**	Immobilized-enzyme technology: Introduction, enzyme immobilization method: Entrapment, carrier-binding and cross-linking method. Medical and analytical applications of immobilized enzymes.	8
6	**Specified Enzymes and applications**	Thermozymes, Cold adapted enzymes, Ribozymes, Hybrid enzymes, Diagnostic enzymes, Therapeutic enzymes: Characteristics, principles and applications.	6
		Total Number of Lectures	**42**

Suggested Text Book(s):

1 Devasena, T., "Enzymology", 1st ed., Oxford University Press, 2010

2 Berg, J.M., Tymoczko, J.L. and Stryer, L., "*Biochemistry*", 5th ed., W.H. Freeman and Company, New York, 2002.

3 Nelson D.L., Cox M.M., "Lehninger Principles of Biochemistry", 5th ed., W.H. Freeman and Company, New York, 2008.

REFERENCE BOOKS

1. Pye, E.K. and Wingard, L.B., "*Enzyme Engineering II*", Plenum Press, 1974.

2. Illanes A, "Enzyme Biocatalysis", Springer Science, 2008.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Other useful resource(s):

https://nptel.ac.in/course.php?disciplineId=102

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	3	1	1	2	2	3	2	2	1	2	
CO-2	1	2	2	2	2	1	-	2	2	2	1	3	
CO-3	2	2	2	2	2	2	1	1	2	-	2	2	
CO-4	2	3	2	1	2	1	-	1	3	2	-	2	
CO-5	1	3	1	3	2	2	1	2	1	2	1	3	
CO-6	1	1	--	2	2	2	2	1	2	2	1	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE TITLE: Industrial Plant Tissue Culture **Credits:3**

COURSE CODE: 21B1WBT531 **Lectures :03/week**

COURSE COORDINATOR: Dr Hemant Sood

Objective:

To provide an insight to the students on different aspects of Plant tissue culture technologies their applications and commercialization for providing beneficiaries.

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, quizzes etc.)	20
Attendance	5
Total	100

Course Outcomes:

CO1. To enable students for applying the knowledge about basic techniques of plant tissue culture.

CO2. To apply the learnt techniques for solving constraints linked with Plant product and technologies

CO3. Enable to learn the strategies for upscaling and commercialization of plant based products.

CO4. To provide insight for exploration and application for bioentrepreneurship

CO5 . To apply knowledge of plant biotechnology for effective planning and strategizing of research projects

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Course content

Topics	Lecture hrs.
Introduction of plant tissue culture and different commercial set ups	2
Different techniques like organ culture, somatic embryos, haploids , callus and suspension cultures	8
Commercially important products generated through plant cell and tissue cultures	3
Development of Transgenics crops (corn ,maize ,poatao, soyabean etc and concerns	4
Secondary metabolites, classifications and utilities	5
Plant stem cells , their maintenance and products	3
Hydrophonics and Aquaphonics along with their industrial applications Technologies used like NFT and TEMPERORY IMMERSION	3
Upscaling and Quantification of plant products (Phytochemicals, volatile oils and flovorants)	3
Automation and robotics ,Extra terrestrial plants	3
Production of flavanoids and phenols through cell culture	3
Production of terpenoids ,alkaloids and their pathways	3
Role of metabolic engineering and high throughput techniques for the advancements and plant products production	3
Commercial units India and overseas and technologies used	2

Assignments on topics:

Each student should submit assignment in the form of soft copy and ppt on any of the topic

1. Research paper analysis on any topic linked with plant tissue culture and plant biotechnology as per the format announce in the class

or

2. Study of any Plant tissue culture unit national or international working successfully
3. IPTC and its role in economic improvement
4. Case studies on any successful set up of IPTC in Pvt. Or Govt
5. Concerns for transgenics: Boom or doom
6. Any business idea for setting unit for commercialization of plant

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

tissue culture as an entrepreneur

Quizes:

There will be two quiz tests conducted each of 10 marks which contain MCQ, fill in the blanks and one word answer.

1. In the last week of Aug &September
2. In the Last week of November

T3 assignment:

Mention about the usage ,working and principle of one high through put or advance equipment used in IPTC like Sequencer, GS chromatography, Biolistic advance machine, robotic usage etc. 10marks

Reading and reference books:

Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application (Principles and Practice) by: Karl-Hermann Neumann publisher: Springer

Plant cell and tissue culture for the production of food ingredients By Tong-Jen Fu, Gurmeet Singh, Wayne R. Curtis, American Chemical Society

Tissue Culture for Plant Propagators by R.A. de Fossard

Application of Plant Cell and Tissue Culture to Agriculture and Industry by D.T. Tomes, B.E. Ellis, P.M. Harney,K.J. Kasha and R.L. Peterson

Plant Culture Media, Volume 1,Formulations and Uses

by E.F. George, D.J.M. Puttock and H.J.George

Plant Culture Media, Volume 2,Commentary and Analysis

by E.F. George, D.J.M. Puttock and H.J.George

Micropropagation: Technology and Application by P.C. Debergh and R.H. Zimmerman Kluwer Academic Publishers

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	Ave rage
CO1	1	2	2	2	2	1	1	2	1	2	2	2	1.67
CO2	2	2	1	2	2	2	1	1	2	1	1	2	1.58
CO3	1	2	2	2	3	1	1	1	2	2	1	2	1.67
CO4	2	2	3	2	2	1	1	2	2	2	2	2	1.92
CO5	1	2	2	2	2	1	2	1	1	2	1	2	1.58
Average	1.40	2.00	2.00	2.00	2.20	1.20	1.20	1.40	1.60	1.80	1.40	2.00	

CO-PSO Mapping

CO/PSO	PSO1	PSO2	Average
CO1	2.0	2.0	2.00
CO2	2.0	2.0	2.00
CO3	1.0	2.0	1.50
CO4	2.0	2.0	2.00
CO5	1.0	2.0	1.50
CO6			
Average	1.60	2.00	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

COURSE TITLE: Intellectual Property Rights and Commercialization
Credits :3

COURSECODE: **Lectures:3/week**

COURSE COORDINATOR : Dr Hemant Sood

Objective:

To provide an insight to the students on different aspects of protection of inventions and research developments and its procedures for filling their protection. It provide scopes of protection of diverse intellectual properties and its commercialization for socio-economic improvement.

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, ppt and quizzes etc .) Attendance	25
Total	100

Course Outcomes:

CO1. To enable students with basic concepts and knowledge of intellectual properties and rights conferred

CO2. To apply and execute different types of IP protection in research and academics

CO3. To enable about the mechanisms of different IP protections and registrations

CO4. To be capable of tackling issues related to IP and its commercialization

CO5. Able to learn the strategies for effective IP management and commercialization

CO6. To develop intellectual property (IP) towards economic and social prosperity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course content

Topics	Lecture hrs.
Introduction of Intellectual properties and rights	2
Different types of IPR(Patents, copyrights, Trademark, Tradesecret, ICL,GI,TK and PBR)	8
Rationale of different IPR ,their mechanism of protection and provisions in Law	4
International IP treaties (Madrid Agreement, Trademark law treaty, Patent Law treaty etc.)	2
WIPO, EPC, WTO, and TRIPS	2
International agreements relevant to biotechnology-associated IP	3
Drafting Patent Application and Documentation	3
Revocation of Patent, Litigation and Infringement	3
IP Management and Financing	4
Commercialization of IP and value addition	2
Methods of commercialization	3
Assignment and Licensing	2
Impact of IP commercialization	2
Bioentrepreneurship management	2
FINAL EXAMINATION	

Assignemnts on topics:

Each student should submit assignment in the form of soft copy and ppt on any of the topic

1. IPR developing knowledge economy…
2. Case studies on different types of Intellectual Property rights (TK, GI, Patent , Coyright etc.) and litigations involved in it.
3. Bioethics and biosafety; Relevance and Essentiality
4. IP management and commercialization: Scopes in research institutes
5. Status of IPR in different countries and its contribution for uplifting economy

Projects: It should be in the form of concept and proposal where rationale of the project and its utilization should be highlighted. It

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

should be submitted in the group of two students per project.

1. Any business idea where any form of IP can be used for value addition and commercialization.

2. Role of bioethics and biosafety in carrying out any biological projects and their significance.

Quizes:

There will be two quiz tests conducted each of 10 marks which contain MCQ, fill in the blanks and one word answer.

1. In the last week of September
2. In the Last week of November

Books: 1.Intellectual Property Rights & Copyright

By Bouchoux

2. IPR- A primer by R. Anita Rao and Bhanoji Rao

3. Intellectual Property Licensing Strategies by Thompson Reuters
4. Perspectives on Commercializing Innovation
by F. Scott Kieff (Editor), Troy A. Paredes (Editor)

Summary:
This module describes (IP) as the most powerful commercial asset that any businesses possess. The value of Intellectual Property lies in its commercialization and not in its mere creation and development.
IP Commercialization is the ability to protect and develop intellectual property (IP) towards economic and social prosperity. In addition, it is a core competency for economies, innovators, and enterprises around the world. Therefore, this module provides inclusive knowledge of basic commercialization process.
IP commercialization can take different forms. The most common are summarized in this module. Patent commercialization is a cryptic job and it requires diligent efforts to convert IP into value. If one strategizes the IP commercialization process then it will be possible to generate revenue from IP. The financial success of any IP exploitation will certainly depend on the choice of the most appropriate commercialization form, which should be based on the organization's business objectives, the form of intellectual property, and the economic resources at its disposal.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Introduction to Deep Learning

COURSE CODE: XXX **COURSE CREDITS:** 3 **CORE/ELECTIVE:** ELECTIVE **L-T-P:** 3-0-0

Pre-requisite:

1) Basic knowledge of Python.
2) Basic linear algebra and probability.

Course Objectives:

1. The goal of this course is to give learners a basic understanding of modern neural networks and their applications in computer vision and natural language understanding.
2. The course starts with a recap of linear models and discussion of stochastic optimization methods that are crucial for training deep neural networks.
3. Learners will study all popular building blocks of neural networks including fully connected layers, convolutional and recurrent layers.
4. Learners will use these building blocks to define complex modern architectures in TensorFlow and Keras frameworks.
5. In the course, project learner will implement a deep neural network for the task of image captioning which solves the problem of giving a text description for an input image.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO-1	Linear regression: mean squared error, analytical solution.	Familiarity
CO-2	Logistic regression: model, cross-entropy loss, class probability estimation	Assessment
CO-3	Gradient descent for linear models. Derivatives of MSE and cross-entropy loss functions.	Assessment
CO-4	The problem of overfitting.	Usage
CO-5	Regularization for linear models.	Usage

Course Contents:

Unit	Contents	Lectures Required
1	**Introduction to optimization:** Linear regression, Linear classification Gradient descent, Overfitting problem and model validation, Model regularization, Stochastic gradient descent, Gradient descent extensions9m	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Introduction to neural networks:** Multilayer perceptron (MLP), Chain rule, Backpropagation, Efficient MLP implementation, Other matrix derivatives, what is TensorFlow, our first model in TensorFlow, What Deep Learning is and is not, Deep learning as a language	8
3	**Deep Learning for images:** Motivation for convolutional layers11m Our first CNN architecture, Training tips and tricks for deep CNNs, Overview of modern CNN architectures, Learning new tasks with pre-trained CNNs, A glimpse of other Computer Vision tasks8m	6
4	**Unsupervised representation learning:** Unsupervised learning: what it is and why bother, Autoencoders 10, Autoencoder applications, Autoencoder applications: image generation, data visualization & more, Natural language processing primer, Word embeddings, Generative models 10, Generative Adversarial Networks, Applications of adversarial approach	6
5	**Deep learning for sequences:** Motivation for recurrent layers, Simple RNN and Backpropagation, The training of RNNs is not that easy, Dealing with vanishing and exploding gradients, Modern RNNs: LSTM and GRU, Practical use cases for RNNs	8
6	**Final Project:** This week you will apply all your knowledge about neural networks for images and texts for the final project. You will solve the task of generating descriptions for real-world images!	6
	Total Lecture Hours	42

Suggested Text Book(s):

Ian Goodfellow, YoshuaBengio, and Aaron Courville, "Deep Learning", The MIT Press, Cambridge, 2016.

- Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer, 2018.

Suggested Reference Book(s):

- Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", 2nd Edition, OReilly Media
- Andrew Ng, "Machine Learning Yearning", available online published by deeplearning.ai

Other useful resources (s):

- http://www.charuaggarwal.net/neural.htm
- https://www.coursera.org/specializations/deep-learning

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

S No	Exam	Marks	Duration	verage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Introduction to Deep Learning)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	3	3	3	2	1	1	1	2	3	2	2	2.1
Average	2	2.6	2.6	2.6	2.4	1	1	1	2	2.4	1.6	2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Introduction to Machine Learning

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

None

Course

Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods, and classification methods.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Gain knowledge about basic concepts of Machine Learning	Familiarity
CO-2	Understand complexity of Machine Learning algorithms and their limitations	Familiarity
CO-3	Solve the problems using various machine learning techniques	Usage
CO-4	Design application using machine learning techniques	Assessment
CO-5	Capable of performing experiments in Machine Learning using real-world data.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Overview of intelligent systems and machine learning, Supervised learning, Unsupervised learning, Reinforcement learning, Bias-variance trade-off, Overfitting, Underfitting, Goals and applications of machine learning	5
2	Linear Regression with One Variable: Model representation, Cost function, Gradient descent, Gradient descent for linear regression	4
3	Linear Algebra: Matrices and vectors, Addition and scalar multiplication, Matrix vector multiplication, Matrix multiplication, Matrix multiplication properties, Inverse and transpose, Multivariable calculus, and Modern applications	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Linear Regression with Multiple Variables: Multiple features, Gradient descent for multiple variables, Feature scaling, Learning rate, Features and polynomial Regression, Normal equation, Noninvertibility	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

5	Logistic Regression: Classification, Hypothesis representation, Decision boundary, Cost function, Simplified cost function and Gradient descent, Advanced optimization, Multiclass classification: One-vs-all	6
6	Bayesian Learning: Probability theory and Bayes rule, Naive Bayes learning algorithm, Parameter smoothing, Generative vs. discriminative training, Bayes nets and Markov nets for representing dependencies.	6
7	Regularization: The Problem of overfitting, Cost function, Regularized linear regression, Regularized logistic regression	4
8	K-Nearest Neighbours: Introduction, KNN algorithm, Parameter selection , KNN as Classifier, KNN as Regressor, Applications	4
9	Machine Learning System Design: Error analysis, Error metrics for skewed classes, Trading off precision and recall, Data for Machine Learning	4
Total lectures		42

Suggested Text Book(s):

1. C. Bishop: Pattern Recognition and Machine learning, Springer, 2006.
2. H. Daume: A course in Machine leaning, 2015.
3. Ethem Alpaydin, "Introduction to Machine Learning", Second Edition, The MIT Press, Cambridge, 2010.

uggested Reference Book(s):

1 T. Hastie, R. Tibshirani, J. Friedman: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer, 2013.

2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC, 2014.

Other useful resource(s):

1. Link to NPTEL course contents: Introduction to Machine Learning https://onlinecourses.nptel.ac.in/noc17_cs26/preview
2. Link to MITOPENCOURESEWARE: Machine Learning https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Machine Learning for Wireless Communication

COURSE CODE: 20B1WEC732

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of communication system

Course Objectives:

1. To understand the fundamentals of machine learning.
2. To understand the various technologies employed in wireless communication system.
3. Apply the machine learning in different field of engineering.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand the basics of machine learning	Familiarity
CO-2	Analyze the behavior of wireless channel	Assessment
CO-3	Able to understand various technology of wireless communication	Assessment
CO-4	Design and develop various machine learning algorithm in the field of wireless communication.	Usage

Course Contents:

Unit	Contents	Lectures required
1	ML overview, What is machine learning, How it works, Different types of Machine Learning, ML challenge, Supervised ML, Unsupervised learning, Deep reinforcement learning.	8
2	Data Scrubbing, Setting up Data, Regression Analysis, Clustering, Bias & Variance, Artificial Neural Networks, Decision Trees.	8
3	Overview of communication system, wireless channel fundamentals, Performance parameters of wireless channel.	8
4	Advanced Technology used in wireless communication: CRN, OFDM and MIMO	10
5	Application of Machine learning in recent technology of wireless communication, mini project work.	8
Total lectures		**42**

Suggested Text Book(s):

1. Wireless Communications – Principles and Practice; by Theodore S Rappaport, Pearson Education Pte. Ltd., Delhi
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005
3. Machine Learning for future wireless communication by Fa Long Lo

Suggested Reference Book(s):

1. Fundamentals of Wireless Communication by Tse David and Viswanath Pramod, Cambridge University press, Cambridge
2. Mobile Communications; By: Schiller, Jochen H; Addison Wesley Longman Pte Ltd., Delhi

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3. Machine Learning Paradigms for Next-Generation Wireless Networks

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Machine Learning for Wireless Communication)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	3	1	1	1	1	2	2	3	**1.75**
CO-2	3	3	2	2	2	2	2	1	2	2	1	2	**2**
CO-3	3	1	2	1	2	2	2	2	2	3	1	1	**1.83**
CO-4	3	3	2	2	2	2	1	2	1	2	2	1	**1.91**
Average	**2.5**	**2.25**	**2**	**1.75**	**2.25**	**1.75**	**1.5**	**1.5**	**1.5**	**2.25**	**1.5**	**1.75**	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Medical Image Processing

COURSE CODE: 18B1WEC847

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To introduce various medical imaging modalities.
2. To teach the requirement and development of different blocks of computer aided diagnosis for medical images.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Able to understand different types of medical imaging modalities and would be able to differentiate them with respect to their advantages and limitations.	Familiarity
CO-2	Acquire an ability to analyze and process medical images.	Usage
CO-3	Understand different feature extraction techniques and classifiers used for image classification.	Usage
CO-4	Understand the role of computer aided diagnosis for medical images.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Image Processing:- Acquisition of Images, Image Sampling and quantization; Spatial and histogram based enhancement; Noise modeling, Image restoration. Image transformation.	8
2	Edge Detection and Image Segmentation: Gradient based edge detectors. Intensity thresholding based image segmentation; Region growing and region splitting algorithm; watershed segmentation.	8
3	Medical Imaging Modalities: Working principle, applications and limitations of Computed tomography , X-ray, Magnetic resonance imaging, Ultrasound imaging, and Positron emission tomography; Various Artifacts.	6
4	Image Texture: Types of texture parameters: Statistical analysis of texture (First order statistics and Second order statistics), Grey level co-occurrence matrix, grey-level run length matrix.	8
5	Pattern classification: Supervised and Unsupervised pattern classification, Neural Network classifier, Support Vector Machines.	6
6	Case Studies: Pre-processing, Segmentation, Feature extraction, and Classification of medical images.	6
Total lectures		42

Suggested Text Book(s):

1. Chris Solomon, Toby Breckon: Fundamental of Digital Image Processing, 1st Ed., John Wiley & Sons, 2011.
2. Rangaraj M. Rangayyan: Biomedical Image Analysis, 1st Ed., CRC Press, New York , 2004.

Suggested Reference Book(s):

1. RC Gonzalez, RE Woods, Digital Image Processing, 3rd Ed., Pearson Publisher, 2008.
2. Kayvan Najarian, Robert Splinter: Biomedical Signal and Image Processing, 2nd Ed., CRC Press, 2012

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3. Tamal Bose: Digital Signal and Image Processing, 1st Ed., John Wiley & Sons, 2003.

Other useful resource(s):

http://www.nptelvideos.in/2012/12/digital-image-processing.html (Prof P.K. Biswas, IIT Kharagpur)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Medical Image Processing)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	3	3	2	3	1	2	1	2	2.42
CO-2	3	3	3	3	2	0	0	1	2	3	1	1	1.83
CO-3	3	3	3	3	3	1	1	1	1	2	1	1	1.92
CO-4	3	3	3	3	3	3	2	3	2	2	3	3	2.75
Average	3.00	3.00	3.00	3.00	2.75	1.75	1.25	2.00	1.50	2.25	1.50	1.75	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Nanotechnology

COURSE CODE: 18B1WPH731
COURSE CREDITS: 3
CORE/ELECTIVE: Elective
L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To provide basic knowledge of nanoscience & technology.
2. To make students familiar with synthesis techniques of nanomaterials
3. To make students familiar with characterization techniques and tools.
4. At the conclusion of the course, the student should have a far greater capacity to read and understand technical articles such as those seen in the IEEE Transactions on Electron Devices, IEEE Transactions on Nanotechnology, etc.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Students will be able to learn basics of nanotechnology.	Familiarity
CO-2	Synthesis of nanomaterials based on requirement.	Familiarity and Assessment
CO-3	Characterization techniques and tools.	Assessment
CO-4	Students will learn the effect of nano-transformation on properties of materials.	Familiarity, Assessment and Usage
CO-5	Applications of nanotechnology in their respective fields as well as in interdisciplinary science and engineering.	Assessment and Usage

Course Contents:

Unit	Content	Lectures required
1	Introduction to Nanotechnology: Surface energy. Nanoparticles etc.	5
2	Synthesis of nanomaterials: Different approaches of synthesis (chemical, mechanical, etc.)	9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

3	Characterization techniques: SEM, STM, AFM, X-ray diffraction, etc.	10
4	Properties of nanomaterials: Electronic, magnetic, optical, chemical and mechanical properties.	12
5	Applications of nanomaterials: Nanostructured materials in memory and electronic devices and for magnetic recording, sensors and interfaces, Biological applications.	6
Total Lectures		42

Suggested Text Book(s):

1. Michael Köhler, Wolfgang Fritzsche, Nanotechnology An Introduction to Nanostructuring Techniques, Wiley, 2nd edition, (2008).
2. G. Cao, Y. Wang, Nanostructures and Nanomaterials: Synthesis, Properties and Applications, World Scientific Series in Nanoscience and Nanotechnology, 2nd edition (2011).
3. Charles P. Poole, Jr., Frank J. Owens, Introduction to Nanotechnology, Wiley, (2003).

Suggested Reference Book(s):

1. Zheng Cui,Micro-Nanofabrication: Technologies and Applications , Springer; (2005).
2. Bhushan, Bharat (Ed.), Springer Handbook of Nanotechnology, Springer-Verlag Berlin Heidelberg (2017).
3. Guozhong Cao and Ying Wang, World Scientific Series in Nanoscience and Nanotechnology: Volume 2 , Nanostructures and Nanomaterials, Synthesis, Properties, and Applications, 2nd Edition (2011).

Other useful resource(s):

1. NPTEL course contents links
2. https://nanohub.org/groups/education
3. All relevant research articles

Evalution Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Couse Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Nanoscience and Technology)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	3	3	2	1	2	1	1	1	1	1.91
CO-2	3	3	2	2	3	1	2	2	1	1	1	1	1.83
CO-3	3	3	3	3	3	2	1	1	1	1	1	1	1.91
CO-4	3	2	3	2	2	1	1	1	1	1	1	1	1.58
CO-5	3	3	3	3	3	3	2	2	2	2	2	2	2.5
Average	3.00	2.60	2.80	2.60	2.80	1.80	1.40	1.60	1.20	1.20	1.20	1.20	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Next Generation Communication Systems

COURSE CODE: 18B1WEC745

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Basic knowledge of wireless communication and probability theory

Course Objectives:

1. To analyze the channel parameters effects on communication system.
2. Understanding of advanced techniques employed for improvement of communication system.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basics of communication system and various standards used in different generation.	Familiarity
CO-2	Understand the modeling of channel used in communication.	Familiarity
CO-3	Analyze the effect of various parameters on the performance of communication system.	Assessment
CO-4	Demonstrate the various techniques for performance improvement of communication system	Assessment
CO-5	Apply advanced techniques to next generation communication system	Usage

Course Contents:

Unit	Contents	Lectures required
1	CDMA: Introduction to various generation of cellular communication systems and standards, Introduction to CDMA and Spread Spectrum, Generation and Properties of PN Sequences, correlation between PN Sequences, Walsh Code, Variable tree OVSF, LFSR, Rake Receiver, Near-Far effect, Multi user CDMA uplink and downlink.	9
2	Channel Characterization of Next generation communication system: BER and SNR analysis of wired and wireless channels, Effect of various channel parameters on performance of wireless communication system, Doppler shift.	6
3	Diversity & Equalization: Diversity System Model, Receiver Diversity: selection diversity, feedback diversity, maximal ratio combining, equal gain combining, Equalizers, Types of Equalizers: linear equalizers, non-linear equalizers.	9
4	Principles of OFDM and MIMO wireless communication: Introduction to OFDM, OFDM Block Diagram, MIMO Wireless Communication, Benefits of MIMO Technology, MIMO OFDM Building Block, Capacity Comparisons of SISO, SIMO, MISO, and MIMO.	9
5	Singular Value Decomposition, Software Defined Radio , Cognitive Radio	9
Total lectures		42

Suggested Text Book(s):

1. T.S. Rappaport, "Wireless Communication", 2nd Edition, Prentice Hall.,2002.
2. A.Goldsmith, " Wireless communication" 1st Edition , Cambridge University Press,2005.
3. Ye Li and Gordon L. Stuber, "Orthogonal Frequency Division Multiplexing for Wireless Communications" 1st Edition, Springer, 2006.

Suggested Reference Book(s):

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

1. Huseyin Arslan: Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, 1st Edition, Springer, 2007.

2. Hui Liu, "OFDM based broadband wireless networks: design and optimization", 1st Edition, John Wiley & Sons, 2006.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/117104099/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes (Next Generation Communication Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	3	2	2	1	2	2	2	1	2	2	2	1.92
CO-2	3	3	3	3	2	2	1	1	1	2	2	2	2.08
CO-3	3	3	3	3	2	1	1	1	1	2	1	1	1.83
CO-4	2	3	3	2	2	1	1	1	1	2	1	3	1.83
CO-5	3	2	2	2	3	2	2	1	1	2	2	2	2.00
Average	2.6	2.8	2.6	2.4	2	1.6	1.4	1.2	1	2	1.6	2	

Approved in Academic Council held on 25.10.2018

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Object-Oriented Technologies using Java

COURSE CODE: 19BIWCI734

COURSE CREDITS: 2

ELECTIVE: OPEN ELECTIVE

L-T-P: 2-0-0

Pre-requisite: Introduction to C Programming

Course Objectives:

Today almost every branch of computer science is feeling presence of object-orientation. Object oriented technology is successfully incorporated in various fields of computer science. Since its arrival on the scene in 1995, the Java has been accepted as one of the primary programming language. This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

Course Outcomes:

S No	Course Outcomes	Level of Attainment
CO1	Understanding the features and concepts of Object-Oriented Programming using Java	Familiarity
CO2	Defining classes, objects, constructors, methods in Java	Usage
CO3	Inheritance, Interfaces, and Polymorphism	Usage
CO4	Packages, Exception Handling, and Multithreading	Usage

Course Contents:

S No	Topics	Lectures required
1	Object-Oriented Concepts: Classes and Objects, Abstraction and Encapsulation, Inheritance, and Polymorphism.	2
2	Java Language Basics Introduction To Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type And Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators.	3
3	Expressions, Statements and Arrays Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump Statements, Arrays.	2
4	Class and Objects Class Fundamentals, Creating objects, Assigning object reference variables, Introducing Methods, Static methods, Constructors,	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • IQAC

	Overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects, Method Overloading, Garbage Collection, The finalize () Method.	
5	Strings and Characters Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using valueOf() Methods, String Buffer Class and Methods.	2
6	Inheritance and Polymorphism Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword.	5
7	Packages and Interfaces Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes, Extends and Implements Together.	4
8	Exceptions Handling Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses	4
9	Multithreaded Programming Multithreading: An Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter-thread Communication.	4
	Total	**32**

Suggested Text Book(s):

1. Herbert Schildt, "Java 2: The Complete Reference." Fifth Edition, (2017)
2. Bruce, Eckel. "Thinking in Java." (2010).

Evaluation Scheme:

S No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 hour.	Syllabus covered upto Test-1
2	T-2	25	1.5 hours	Syllabus covered upto Test-2
3	T-3	35	2 hours	Syllabus covered upto Test-3
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance – 3 Participation in class-2

Course Outcomes (COs) contribution to the Programmed Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	2	2	1	2	2	1	1	1	3	3	**1.75**
CO-2	1	1	3	1	3	3	3	1	2	1	1	3	**1.92**
CO-3	2	2	1	2	1	1	2	3	1	3	2	1	**1.75**
CO-4	1	3	3	3	3	3	1	1	2	1	2	1	**2**
Average	**1.5**	**1.75**	**2.25**	**2**	**2**	**2.25**	**2**	**1.5**	**1.5**	**1.5**	**2**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Object-Oriented Technologies using Java Lab

COURSE CODE: 19BIWCI774
COURSE CREDITS: 1
CORE/ELECTIVE: OPEN ELECTIVE
L-T-P: 0-0-2
Pre-requisite: Introduction to C programming

Course Objectives:

Today almost every branch of computer science is feeling presence of object- orientation. Object oriented technology is successfully incorporated in various fields of computer science. Since its arrival on the scene in 1995, the Java has been accepted as one of the primary programming language. This course is designed to give you exposure to basic concepts of object-oriented technology. This course will help in learning to write programs in Java using object-oriented paradigm. Approach in this course is to take Java as a language that is used as a primary tool in many different areas of programming work.

Course Outcomes:

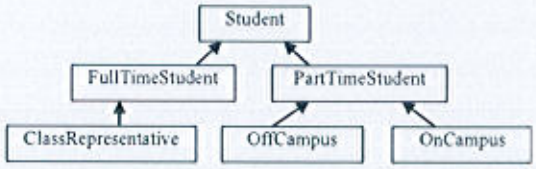
S No	Course Outcomes	Level of Attainment
CO1	Understanding the features and concepts of Object-Oriented Programming using Java	Familiarity
CO2	Defining classes, objects, constructors, methods in Java	Usage
CO3	Inheritance, Interfaces, and Polymorphism	Usage
CO4	Packages, Exception Handling, and Multithreading	Usage

List of Experiments

S No	Description	Hours
1	i. Write a Java program to check if a number is a palindrome in Java. ii. Write a Java program to print following structure. * *** ***** *** *	2
2	Write a program in Java to print the Fibonacci series up to a given number? Write both iterative and recursive versions.	2
3	Define a class Queue in Java with methods to insert and delete the data (int type) from the queue. The queue must be implemented using array.	2
4	Define a class LinkedList in Java with members data of integer type and a reference next of LinkedList type. Define methods to insert and display the elements of the linked list.	2

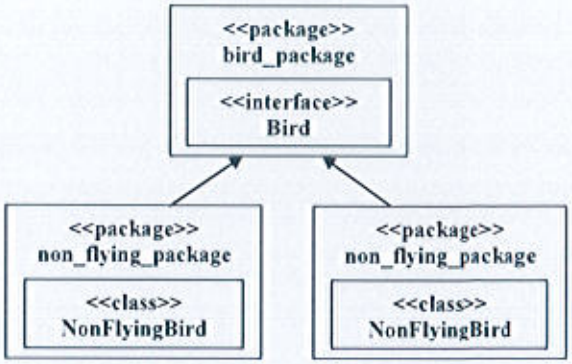
Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	Implement a singleton class. A class whose number of instances that can be instantiated is limited to one is called a singleton class. (Hint: make use of static members).	2
6	Write a Java program that accepts two strings S1 and S2 as input. The program should check if either of the input strings is a substring of the other and give appropriate message as output.	2
7	Mid-Semester Practical Examination	2
8	Design and implement the following class hierarchy using Java.  	2
9	Define a class named Television in Java that has data members to hold the model number of a television, the screen size in inches, and the price. The class has methods to enter and display the details of the television. The class throws an exception "TelevisionException under the following conditions: • If more than 4 digits are entered for the model number • If the screen size is smaller than 12 inches or greater than 70 inches. • If the price is negative or greater than Rs 50,000.	2
10	You may include additional data members in the classes. The class Programme is defined inside the package pack1.pack2, whereas classes FullTime and PartTime are defined inside the package pack1. You should include at least one constructor in each class. All the classes should have two methods as getProgrammeInfo() and printProgrammeInfo() to enter and display all the information of that object, respectively.	2
11	Define a class *First* inside a package pack1 with an integer data member *i* and methods to enter and display the value of *i*. Define another class inside a package pack2, which is a sub package of pack1. The class *Second* has a float type data member *f* and methods to enter and display the value of *f*. Now, import both of the above classes and instantiate their objects in the main method. Thereafter, call the methods of both the classes.	2
12	Realize the following class diagram using Java.	2

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

		
13	Write a program for generating two threads using Runnable interface. One thread is used for printing the numbers (1 to 26) and the other for printing alphabets (A to Z). Which of the two threads will be executed first (assuming that both of the threads are set to the same priority)?	2
14	End-Semester Practical Examination	2
	Total Lab hours	**28**

Evaluation Scheme:

S No	Exam	Coverage/Scope of Examination	Marks
1	Mid Term Test	Viva and Written Exam	20
2	End Term Test	Viva and Written Exam	20
3	Lab Records		15
4	Teacher Assessment	(Quality and quantity of experiment performed, learning laboratory skills)	30
5		Attendance and Participation in lab	9+6=15
6	Total		100

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	1	2	2	1	2	2	1	1	1	3	3	**1.75**
CO-2	1	1	3	1	3	3	3	1	2	1	1	3	**1.92**
CO-3	2	2	1	2	1	1	2	3	1	3	2	1	**1.75**
CO-4	1	3	3	3	3	3	1	1	2	1	2	1	**2**
Average	**1.5**	**1.75**	**2.25**	**2**	**2**	**2.25**	**2**	**1.5**	**1.5**	**1.5**	**2**	**2**	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Optical Fiber Network Design

COURSE CODE: 18B1WPH732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Learn to analyze algorithms for Time and Space Complexity
2. Learn asymptotic notations for performance analysis of algorithms.
3. Learn various computing algorithms and data structure used in solving complex problems.
4. Apply important algorithmic design paradigms and method of analysis.
5. Synthesize efficient algorithm design in common engineering design situations.

Course Contents:

Unit	Contents
1	**Basics of fiber optics:** Propagation, Dispersion, Attenuation and loss limits, Wave propagation in step index fibers, fiber gratings, Nonlinear effects in Fibre
2	**Optical fiber components** Optical fiber splices, connectors, couplers, Transmitters and Receivers
3	**Optical Link design:** Data Coding, Source selection, Power Budget, Optical amplifiers, dispersion compensation, Solitons, Soliton link Design
4	**Single wavelength fiber optic networks:** Network topologies, Standard fiber networks, FDDI networks, SONET/SDH
5	**Wavelength division multiplexing:** Selective WDM, Broad band WDM, Multiplexers, sources, nonlinearity in WDM links, WDM and optical amplifiers, Multipoint, Multi wavelength networks

Suggested Text Book(s):

1. Gerd Keiser: Optical Fiber Communication, 4th Edition, Tata McGraw-Hill Ltd., 2008.
2. A. Ghatak, K. Thyagarajan: Introduction To Fiber Optics, Foundation Books, 2002.
3. J. M. Senior: Optical Fiber Communications Principles and Practice, 2nd Edition, Prentice Hall India Pvt. Ltd., 2004.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Reference Book(s):

1. Govind P Agrawal: Fiber-Optic Communication Systems, John Wiley & Sons Asia, 2003.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teacher Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT

Optimization Techniques

COURSE CODE: 10B1WMA731

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems
2. Provide students with the basic mathematical concepts of optimization.
3. Provide students with the modeling skills necessary to describe and formulate optimization problems.
4. Provide students with the skills necessary to solve and interpret optimization problems in engineering.
5. To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Solve linear programming problems by different methods.	Familiarity
CO-2	Understand duality and dual simplex method.	Familiarity Assessment
CO-3	Understand assignment problem and method for solving it.	Familiarity
CO-4	Understand transportation model and finding solution of transportation problem.	Familiarity
CO-5	Solve Integer programming problems by different methods.	Usage
CO-6	Solve nonlinear programming problem by Lagrangian multiplier method.	Assessment
CO-7	Learn about KT conditions for solving NLPP.	Familiarity

Course Contents:

Unit	Contents	Lectures required
1	**Linear Programming Problems(LPP):** Definition of LPP, Simplex Method, Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Sensitivity Analysis, Revised Simplex Method	10

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Linear Programming Problems(LPP):** Duality, Dual Simplex Method	5
3	**Assignment Problems:** Definition, Hungarian Method for AP	4
4	**Transportation Problems:** Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method. Techniques for Obtaining Optimal Basic Feasible Solution	9
5	**Integer Linear Programming Problems:** Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method	6
6	**Introduction to NLP :** Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe's Method for Quadratic Programming Problem	4
7	**Introduction to NLP :** Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-points etc	4
Total lectures		**42**

Suggested Text Book(s):

1. Taha, H.A.: Operations Research- An Introduction, New York, Macmillan, 1992.
2. Harvey M. Wagner: Principles of Operations Research with Applications to Managerial Decisions, Prentice Hall of India Pvt. Ltd 1975.

Suggested Reference Book(s):

1. Hadley, G.: Linear Programming, Massachusetts: Addison- Wesley, 1962.
2. Hiller, F.S.and Lieberman G.J.: Introduction to Operations Research, San Francisco: Holden-Day, 1995.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/111107104/
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/111107104/6
   ii. https://nptel.ac.in/courses/111107104/7
   iii. https://nptel.ac.in/courses/111104027/
   iv. https://nptel.ac.in/courses/111102012/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of

Department of Mathematics

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

				Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (1) - 5 Quizzes (1) - 15 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	0	1	0	1	0	1	0	1	1	**1.08**
CO-2	3	3	2	0	1	0	0	0	1	0	1	0	**0.92**
CO-3	3	3	2	0	1	0	0	0	1	0	1	0	**0.92**
CO-4	3	2	1	1	1	0	1	0	1	0	1	1	**1**
CO-5	3	2	1	1	1	0	0	0	2	0	1	1	**1**
CO-6	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
CO-7	3	3	2	0	1	0	0	0	0	0	1	0	**0.83**
Average	**3**	**2.71**	**1.714**	**0.28**	**1**	**0**	**0.28**	**0**	**0.85**	**0**	**1**	**0.42**	

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Optimization Techniques

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: Basics of engineering mathematics

Course Objectives:

1. To lay strong foundations in understanding the importance of optimization techniques.
2. To apply the theoretical knowledge acquired to various applications.
3. To analyze and appreciate variety of performance measures for various optimization problems.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	To formulate and solve linear programming problems.	Familiarity
CO-2	To solve the problems on networks models such as Transportation, Assignment, Shortest path, minimal spanning tree, and Maximal flow.	Usage
CO-3	To solve the problems of Project Management using CPM and PERT	Usage
CO-4	Solve Non-linear Programming problems of some kinds.	Familiarity and Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Operation Research: Operation Research approach, scientific methods, introduction to models and modeling techniques, general methods for Operation Research models, methodology and advantages of Operation Research, history of Operation Research.	8
2	Linear Programming (LP): Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Integer linear programming.	8
3	Transportation & Assignment Problems: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems.	6

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Network Analysis: Network definition and Network diagram, probability in PERT analysis, project time cost trade off, introduction to resource smoothing and allocation.Sequencing: Introduction, processing N jobs through two machines, processing N jobs through three machines, processing N jobs through m machines.	8
5	Inventory Model: Introduction to inventory control, deterministic inventory model, EOQ model with quantity discount.	6
6	Non-Linear Programming: Characteristics, Concepts of convexity, maxima and minima of functions of n-variables using Lagrange multipliers and Kuhn-Tuker conditions, One dimensional search methods, Fibonacci, golden section method and gradient methods for unconstrained problems.	6
Total lectures		42

Suggested Text Book(s):

1. J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.
2. N D Vohra, Quantitative Techniques in management, Tata McGraw Hill.
3. Handy A Taha, Operations Research – An Introduction, Prentice Hall of India, New Delhi.

Suggested Reference Book(s):

1. Wagner H M, Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India, New Delhi.
2. Hillier F S and Lieberman G J, Operations Research, Holden Day Inc., San Francisco.
3. Payne T A, Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co. Inc., Virginia.
4. Wilkes F M, Baum P and Smith G D, Management Science: An introduction, John Wiley and Sons, Santa Barbara.

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/111/105/111105039/ https://nptel.ac.in/courses/105/108/105108127/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Optimization Techniques)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2	1	1	1	2	1	2	1.7
CO-2	2	3	2	3	2	2	1	1	1	2	1	2	1.8
CO-3	3	3	3	3	3	2	1	1	1	2	1	2	2.1
CO-4	2	2	2	2	2	2	1	1	1	3	1	2	1.8
Average	2.25	2.5	2.25	2.5	2.25	2.0	1.0	1.0	1.0	2.25	1.0	2.0	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Pattern Analysis in Machine Intelligence

COURSE CODE: XXXXXXXX

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

None

Course

Objectives:

1. To introduce the concept of patterns for data analysis.
2. To analyze patterns to make machine take some decision.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the concept and representation of patterns in different data.	Familiarity
CO-2	Understand and able to visualize the concept and methodology of different feature extraction and feature selection methods.	Usage
CO-3	Able to understand the methodology of different classifiers.	Assessment
CO-4	Understand the concept of unsupervised learning for pattern recognition.	Assessment
CO-5	Able to implement different classifiers and their combinations for different applications.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction: Definitions, data sets and Different Paradigms of Pattern Recognition, Representations of Patterns and Classes.	6
2	Feature Extraction and Selection: Metric and non-metric proximity measures, Feature extraction and different approaches to Feature Selection.	12
3	Introduction to Supervised learning: Bayes Classifier, Decision Trees, Linear Discriminant Function and Support Vector Machines.	12
4	Introduction to Unsupervised learning: Clustering Methods	6
5	Combination of Classifiers for different applications.	6
Total lectures		42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. R. O. Duda, P.E. Hart and D. G.Stork,,"Pattern Classification", 2nd Ed., Wiley, 2000.
2. H. Simon, "Neural Networks and Learning Machines",3rd ed., Prentice Hall, 2009.

Suggested Reference Book(s):

1. Jiawei Han, Jian Pei, Micheline Kamber, "Data Mining: Concepts and Techniques", 3rd ed., Elsevier Amsterdam, 2011.
2. C. Bishop, "Pattern Recognition and Machine learning", 1st ed., Springer, 2006.

Other useful resource(s):

1. https://nptel.ac.in/courses/117105101/ (Prof P.K. Biswas, IIT Kharagpur)
2. http://www.cs.ucsb.edu/~yfwang/courses/cs290i_prann/index.html (Prof. Yuan-Fang Wang)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) -10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Pattern Recognition in Machine Intelligence)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	3	3	1	1	1	1	3	1	3	2.2
CO-2	3	3	3	3	3	1	1	1	2	3	1	3	2.2
CO-3	3	3	3	3	3	2	2	2	2	3	1	3	2.5
CO-4	3	3	3	3	3	2	2	2	2	3	1	3	2.5
CO-5	3	3	3	3	3	2	2	2	2	3	2	3	2.6
Average	3	3	2.8	3	3	1.6	1.6	1.6	1.8	3	1.2	3	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Real Time Operating Systems

COURSE CODE: XXXXXXXX

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Prerequisites are basic knowledge of computer architecture and operating systems

Course Objectives:

1. Study of design of real time operating systems and their operations.
2. Design and analysis of real time system software.
3. Modeling and verification of real time systems
4. Use real time system programming languages and real time operating systems for real time applications.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Fundamental principles for programming of real time systems with time and resource limitations.	Familiarity
CO-2	Foundation for programming languages developed for real time programming.	Assessment
CO-3	How real time operating systems are designed and functions.	Assessment
CO-4	Study of application domains.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).	8
2	Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use	8
3	Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem	7
4	Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.	7

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

5	RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.	6
6	Fault – Tolerant Design: A Case Study, Case Study in Software Requirements Specification for Four way, Traffic Intersection Traffic Light Controller System.	6
Total lectures		42

Suggested Text Book(s):

1. Qing Li, "Real Time Concepts for Embedded Systems", 2011, Elsevier.

Suggested Reference Book(s):

1. Rajkamal, "Embedded Systems- Architecture, Programming, and Design", 2007, TMH.
2. W. Richard Stevens, Stephan A. Rago, "Advanced UNIX Programming", 2006, 2nd Edition, Pearson.
3. Dr. Craig Hollabaugh, "Embedded Linux: Hardware, Software and Interfacing", 2008, 1st Edition, Pearson.

Other useful resource(s):

Link to topics related to course:

1. https://nptel.ac.in/courses/106/105/106105172/
2. https://onlinecourses.nptel.ac.in/noc20_cs16/preview

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Real Time Operating Systems)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	3	3	2	1	1	1	2	2	2	2	1.91
CO-2	3	3	3	3	3	2	1	1	3	2	1	3	2.33
CO-3	2	3	2	2	2	2	2	2	2	2	1	2	2.00
CO-4	3	3	3	3	2	1	1	1	2	3	2	3	2.25
Average	2.50	2.75	2.75	2.75	2.25	1.50	1.25	1.25	2.25	2.25	1.50	2.50	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
IQAC
WAKNAGHAT • ABOVE

DEPARTMENT OF BIOTECHNOLOGY & BIOINFORMATICS

Course Title Stem Cells and Regenerative medicines **(Core Course)**

Course Code

L	T	P
3	0	0

Course Credit 3

Course Coordinator Dr. Udayabanu, M.

Pre-requisite Basic understanding of biology and cell culture

Course Objectives

The objective of the course is to develop an understanding of important concepts and design aspects of bioreactors and their functioning and scale up.

Course Assessment

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Unit 1-2
T2 Test	25	1.5 hrs.	Unit 1-5
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Sem	Inform class time to time
Total	**100**		

Course Outcomes

CO I	Able to understand current medicine therapy and embryonic stem cell
CO II	Able to understand different tissues and adult stem cell
CO III	Able to understand heart, muscle and neural stem cells
CO IV	Able to understand regenerative medicine and application of stem cells
CO V	Able to understand tissue engineering

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Topic Covered

S. No.	Unit	Topics Covered	Contact Hrs.
1	Introduction	Overview of current medicine and therapy, introduction to stem cells, and regenerative therapy. Totipotency, pluripotency, multipotency, progenitors, etc. Different types of stem cells –embryonic , adult stem cells, induced pluripotent cells (iPSCs), localisation, niche, etc.	4
2	EMBRYONIC STEM CELLS, NUCLEAR REPROGRAMMING, AND STEM CELL FATE	Development of Diverse Hematopoietic Cell Populations from Human Embryonic Stem Cells Using Embryonic Stem Cells as a Model of Pancreatic Development Isolation and culture of mesenchymal stem cells	8
3	ADULT STEM CELLS	Introduction to different tissues and systems of human body. Multipotent Adult Progenitor Cells, localisation and stem cell proliferation. Neural stem cells, bone marrow cells, Ocular Surface Epithelial Stem Cells, etc	4
4	STEM CELLS FOR MUSCLE AND HEART	Stem Cells in Skeletal Muscle Regeneration, Myogenic Precursor Cells in the Extraocular Muscles, Treating Coronary Heart Disease with Progenitor-Cell-based Repair, Postnatal Stem Cells for Myocardial Repair.	6
5	STEM CELLS FOR THE NERVOUS SYSTEM	Use of a β -Galactosidase Reporter Coupled to Cell-Specific Promoters to Examine Differentiation of Neural Progenitor Cells In Vivo and In Vitro From Neural Stem Cells to Neuroregeneration Cochlear Stem Cells/Progenitors Intravascular Delivery Systems for Stem Cell Transplantation in Neurologic Disorders Stem Cell Strategies for Treating Inner Ear Dysfunction	9
6	Regenerative Medicine	Regenerative Medicine : Overview, Gene therapy, regenerative medicine, Bioprinting, Stem Cells and Regenerative Medicine in diseases, Genetic Reprogramming	4
7	Tissue Engineering	Tissue engineering overview, Cells and Biomaterials : The Tissue engineering Approach, An overview of various Scaffolds, Regulation of cell function in tissue engineering, scaffold fabrication techniques, Bioreactor in Tissue Engineering, Transplantation Immunology: Organ and Tissue Transplantation Immunosuppressive Agents, Immunosuppressive Therapy	7
		Total Number of Lectures	42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Methodology

The course will be covered through lectures. Apart from discussions on topics covered in lectures, assignments and numerical problems will also be given.

TEXT BOOKS

1	Krishnarao Appasani and Raghu K. Appasani, Stem Cells & Regenerative Medicine, Humana Press
2	Walter C. Low and Catherine M. Verfaillie, Stem Cells and Regenerative Medicine, World Scientific Publishing Co. Pte. Ltd USA (2008)

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Structural Bioinformatics

COURSE CODE: 18B1WBI531

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Structural Biology

Course Objectives:

1. To develop the ability to design, predict, analyze and compare the protein structures as well as predict the function of target proteins.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understanding the fundamental concepts of structural biology (chemical building blocks, structure, superstructure, folding, etc.)	Familiarity
CO-2	To Understand and use structural databases and software for structure visualization	Familiarity
CO-3	To understand the algorithms used in Structure determination and quality assessment	Assessment
CO-4	To perform protein structure comparison and the hierarchical nature of biomacromolecular structure classification	Usage
CO-5	To understand the methodology of protein structure prediction and assessment	Assessment
CO-6	To understand the methodology of sequence- and structure-based functional site prediction	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction of protein structure:** Overview of syllabus and protein structure (amino acids and peptide bonds; primary, secondary, super-secondary, tertiary and quaternary structure of proteins).	3

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Fundamental concepts of structural biology:**Chemical	6
	building blocks, structure, superstructure, folding, etc.; the physical forces that shape macromolecules; structural databases (protein data bank, SCOP database, CATH database and other structure based databases)	
3	**Secondary structure of protein:**Computational methods for prediction of secondary structure of protein sequences (Chou-Fasmann, GOR and Neural Networks) and reliability (Q3 value and SOV score)	3
4	**Tertiary structure of protein:**Prediction of tertiary structures of protein sequences (Homology and Threading methods); structure quality assessment.	6
5	**Protein structures comparison and alignment:**General approach of alignment and comparison, comparison algorithm & optimization, statistical analysis of results, multiple structural alignment.	3
6	**Analysis of 3D structures:**Secondary structure assignment, assignment of hydrogen bonds, coulomb hydrogen bond calculation, empirical hydrogen bond calculation, assignment methods of secondary structure (DSSP, STRIDE, DEFINE, P-Curve)	3
7	**Identifying structural domains in protein:**How structural domains are defined? First and second generation algorithms for domain assignments, domain assignment based on graph theoretical methods, prediction of binding sites and characterization.	3
8	**Ab initio protein structure prediction:**Empirical force field for biomolecular simulations, Potential Energy Function (bond length potential, bond angle potential, torsional potential, van der Waals potential and coulomb potential), classical representations of electrostatics (Poisson-Boltzmann, Generalized Born and Colombic).	6
9	**Energy minimization techniques:**Concept of local and global minima, energy minimization protocol, energy minimization algorithms (steepest descent, conjugate gradient, Newton Raphson)	3
10	**Molecular Dynamics simulations:**Monte Carlo Simulations, Techniques for efficient conformational search: Simulated Annealing, Calculation of Free energy using simulation techniques.	6
Total Lectures		**42**

Suggested Text Book(s):

1. Structural Bioinformatics (2nd Edition), Jenny Gu (Editor), Philip E. Bourne (Editor)
2. D.W. Mount Bioinformatics: Genome and Sequence Analysis: (2001) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
3. Molecular Modeling: Principles & Applications, Andrew R. Leach, Prentice Hall

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Evaluation Scheme:

Assessment	Max. marks	Duration	Course Covered
T1 Test	15	1 hr.	Syllabus covered up to Test-1
T2 Test	25	1.5 hrs.	Syllabus covered up to Test-2
End Term Test	35	2 hrs.	Whole Syllabus
Teacher Assessment (Based on Assignments, quizzes etc.)	25	Whole Semester	Inform class time to time
Total	**100**		

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	1.83
CO2	3	3	3	3	3	1	1	1	1	1	1	3	2.00
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	2	2	3	3	3	3	1	1	1	1	1	1	1.83
CO6	2	3	3	3	2	2	2	2	2	2	2	2	2.25
Average	2.67	2.83	2.80	2.80	2.60	2.20	1.20	1.00	1.00	1.00	1.20	1.40	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Sustainable Technologies for Waste Management

COURSE CODE: 19B1WBT731

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: Environmental pollution: Cause and remediation strategies

Course Objectives:

1. Sustainable strategies and technologies for waste and resource management at national and international level for overall development in this sector

Course Outcomes:

CO I. Students will know about the types of waste, their prevalence and available treatment options.

CO II: Students will be able to grasps the concepts of waste to energy technologies and apply their knowledge to look for appropriate one.

CO III. Students will develop the skill of linking waste and management strategies to society and its needs.

CO IV: Students will develop an understanding risk assessment and life cycle of the waste.

CO V: Students will be able to recognize real-world examples of waste disposal and handling

Course Content:

S.No.	Topics	No. of lectures
1	**Introduction** Concept of Sustainable Technologies for waste management.	2
	Technology Matrix for Solid Waste Management Type of Wastes and appropriate technologies, Municipal Solid Waste, Industrial waste, medical and other wastes. Status of various waste streams in India and available treatment options	5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

2	**Waste to Energy Technologies** Technologies for recovering energy from waste, based in part on their potential for climate change mitigation and relevance to India, Case studies of adapted waste-to-energy technologies and evaluating their impact. The focus will be on methane, hydrogen and ethanol and next generation fuel technologies utilizing agricultural and municipality waste.	6
3	**Developing Sustainable Strategies** Corporate / Organizational responsibility, Sustainability strategy development., Management tools, Sustainable/ethical investment accounts , Silos and open access, Product development and design	5
4	**Electronic waste and Battery Waste Management** MOEFCC policy advice and carrying out activities relating to electronic/battery waste management, current status in India and global projections, hazardous substances in e- /battery waste and health perspectives, recycling technologies for e-/battery wastes, new strategies for waste collection and disposal, extended producer responsibility	5
5	**Green composites and Bioelectrochemical systems for sustainable world** Green composites: towards a sustainable future; Cellulose fiber/nanofiber from natural sources including waste-based sources; Clean production strategies; Green composites for the built environment Microbial electrosynthesis; BES for sustainable agriculture; BES for sustainable energy production and product recovery; Life cycle assessment of a BES	8
6	**Industrial Ecology & Economic, Social and legal instruments** The onset of industrial ecology and conceptual framework and linkages with waste management. Social issues and costs associated with waste management, traditional approaches to financing, the new advisory projects in India, economic incentive systems to avoid or recycle waste, Laws and obligations related to waste management, carbon foot print.	6
7	**Risk Assessment and Life cycle assessment of Waste, Case studies** Hazardous wastes and their risk assessment, available models and management, life cycle inventory and impact assessment	5
	Total	42

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

Evaluation scheme:

T1	1 hour	15 (course covered upto T1)
T2	1.5 hour	25 (course covered upto T2, including that covered upto T1)
T3	2 hours	35 (total syllabus)

Tutorials, quiz, and home assignments	25
Total	100

Text books and Reference books:

1. Sustainable Solid Waste Management. A system engineering approach. Chana Ni-Ben and Pires Ana. IEEE Press.
2. E-waste: Implications, regulations, and management in India and current global best practices. Rakesh Johri. Teri Press.
3. Green Composites: Natural and waste-based composites for a sustainable future by Caroline Baillie and Randika Jayasinghe
4. Solid Waste Management - A Manual by All India Institute of LocalSelf-Government Publications
5. Toxic and Hazardous Waste by Sinha P.C.
6. Manual on Solid Waste Management by Palnitkar, Sneha
7. Basic Hazardous Waste Management by William C. Blackman
8. Management Of Municipal Solid Waste by Ramchandra T. V.
9. Solid Waste Management by H V. Bijalani
10. Scientific and research articles from Elsevier, Springer, Wiley and RSC Journals
11. TED talks

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Switching Theory and Logic Design

COURSE CODE: COURSE

CREDITS: 3

CORE/ELECTIVE: ELECTIVE L-T-P:

3-0-0

Pre-requisite: None

Course Objectives:

1. To make the students understand the concepts of digital circuits.
2. To design complex digital circuits based on the given requirement.
3. Understand the programming of digital circuits using VHDL.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic concepts of digital circuits.	Familiarity
CO-2	Learn about different the basic principles used in the working of digital circuits.	Familiarity
CO-3	Understand various hazards encountered in designing these circuits.	Assessment
CO-4	Learn to write programs using VHDL.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Digital Circuits: Design of combinational circuits, Quine- McCluskey method, sequential machine fundamentals - the need, concept of memory, Flip flops, sequential machine operations, classifications. Switching Circuits. Logic families: TTL, nMOS, CMOS, dynamic CMOS. Logic design using ROMs, PLAs and FPGAs. Case studies	5
2	Design of Synchronous Sequential Circuits: Sequential circuits, Finite state model – Basic definition, capabilities and limitation of finite state machines, state equivalence & machine minimization, simplification of incompletely specified machines, Extraction of maximal compatibles, synthesis & analysis of synchronous sequential circuits.	8
3	Design of Asynchronous Sequential Circuits: Introduction to asynchronous circuits, timing diagram, state diagram & flow tables, types of asynchronous circuits, fundamental mode circuits, pulse mode circuits, state assignment in asynchronous sequential circuits, Synthesis and analysis, ASM charts: Representation of sequential circuits using ASM charts.	8

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

4	Hazards and Races: Introduction, gate delays, generation of spikes, production of static hazards in combinational networks, elimination of static hazards, design of hazard free combinational networks, hazard free asynchronous circuit design, dynamic hazards, essential hazards, Races and Cycles.	9
5	VHDL/Verilog HDL: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches. Language constructs and conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.	12
Total lectures		42

Suggested Text Book(s):

1. Switching and Finite Automata Theory, ZVI Kohavi, Third Edition, Cambridge University Press.
2. John M Yarbrough : Digital Logic Applications and Design, 2nd Edition, Thomson Education
3. W. I. Fletcher :An Engineering approach to Digital Design , PHI

Suggested Reference Book(s):

1. Digital Systems Design using VHDL – Charles H Roth, CENGAGE Learning.

Other useful resource(s):

1. NPTEL: https://nptel.ac.in/courses/106/105/106105185/
2. Coursera: https://www.coursera.org/learn/digital-systems
3. Swayam: https://swayam.gov.in/nd1_noc19_cs74/preview

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes(2) - 10 Attendance - 5

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Switching Theory and Logic Design)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	2	2	2	2	x	x	x	1	3	3	2.22
CO-2	3	3	3	2	2	3	x	x	x	1	2	3	2.44
CO-3	3	3	2	3	3	2	x	x	x	1	2	3	2.44
CO-4	3	3	2	3	3	2	x	x	x	1	3	2	2.44
Average	3	2.75	2.25	2.5	2.5	2.25	x	x	x	1	2.5	2.75	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

INTERNATIONAL HUMAN RESOURCE MANAGEMENT

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE
L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1 .Students gain insight into and appreciation for the complexities and differences of operating a business in an international context as it applies to HRM.

2. Understand human resource management systems and their main challenges in multinational companies and improve their performance accordingly,
3. Efficiently implement specific IHRM activities in multinational companies,
4. Make better strategic decisions about people in international settings
5. Design effective IHRM systems and practices for MNCs.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Define, explain and compare perspectives and theories related to IHRM	Familiarity
CO-2	Make use of an in-depth understanding of research in IHRM to critically analyse theories, perspectives, and practical problems facing contemporary firms	Assessment
CO-3	Systematically illustrate, define, categorise, and analyse a broad range of issues and problems facing MNCs in their IHRM activities	Assessment
CO-4	Use concepts and tools for explaining and developing theories and methods which can be integrated into practical applications of IHRM	Usage
CO-5	Present, both in speech and writing, the impact of IHRM in MNCs and Discuss, critically reflect upon and evaluate ethical matters related to IHRM	Usage

Subject Code		**Semester**	8
Subject Name	International Human Resource Management		
Credits	03	**Contact Hours**	42
Course Coordinator	Dr Tanu Sharma		

Course Contents:

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY IQAC WAKNAGHAT

Chapter	Topic	Course	Hours
1	Introduction Case : NCR in Scotland	Defining International HRM Variables that moderate differences between domestic and international HRM Applying a strategic view of IHRM	2
2	Internationalization of HRM :Socio-Cultural Contexts Case: Oki UK ltd	National Culture and HRM HRM and its broad context National Culture and Specific HRM Issues Business imperatives and Other non – cultural influences on HRM	3
3	National Context of HRM: case of 7 major economies Case :Litton imports cell manufacturing from Sweden	Major economies and their HRM practices HRM in Japan , United States, United Kingdom, Turkey, Arab Middle East, India, China	3
4	**Strategic IHRM** Case : Orgaon laboratories ltd, scotland	• **Introduction to Strategic Management & Industry Analysis** • **Internal Analysis: Resource-Based Strategy** • **Competitive Strategies** • **Corporate Strategies & Globalization** • **Corporate Sustainability**	**3**
5	Staffing International operations for sustained global growth	Approaches to staffing Transferring staff for international business activities The roles of an expatriate The role of the corporate HR function in MNEs	3
6	Recruiting and selecting staff for international assignments	Issues in staff selection ,Factors moderating performance, Selection Criteria, Dual career couples, Are female expatriates different?	3
7	International training and development Case : Seiko Instruments Case : Transfer of Knowledge in Oki-Training and development	The role of expatriate training Components of effective pre-departure training programmes The effectiveness of pre-departure training Developing staff through international assignments	5
8	International compensation	Objectives of international compensation Key components of an international compensation	3

Assistant Registrar (Acad.)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT • SOLAN

	Case : News International plc	program	
9	Re-entry and career issues	The repatriation process, Individual reactions to re-entry , Multinational responses Designing a repatriation programme	3
10	IHRM in the host country context	Standardization and localization of HRM practices Factors driving standardization and Localization Code of conduct- monitoring HRM practices in the host country	4
11	International industrial relations Case : Elementis and Michelin	Key issues in international relations Trade unions and international industrial relations	4
12	Performance Management Case : Tubular Industries Scotland Ltd.	Multinational performance management Performance management of international employees	3
13	IHRM trends: complexity, challenges and choices in the future	Research issues and theoretical developments	3
		Total Hours	42

Methodology

The course follows a teaching-learning method with classroom discussions and activities on fundamental concepts of IHRM The format will emphasize capstone lectures, class discussion of assigned readings and other topics, in-class exercises, case analysis, and a group project.

Suggested Text Book(s):

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Peter J. Dowling, Marion Festing & Allen D. Engle, SR.:International Human Resource Management (fifth Edition)
2.	D. Briscoe, R. Schuler, & I. Tarique (2012). **International Human Resource Management (4th Edition).** London/New York: Routledge.
3.	Jackson, T.: **International dimensions of human resource management.** London, 2002.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY • WAKNAGHAT •

4.	Dessler, G.: **Human Resource Management**. 9th ed., New York, 2003.
5.	Harzing, A. W. & Ruysseveldt, J. (2004). **International human resource management (2th Ed.).** Sage Publication: London.
6.	Briscoe, D. R., Claus , L. M., Schuler , R. S. (2009). **International human resource management: Policies and practices for multinational enterprises.** Routledge

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire	5 marks attendance
			Semester	08 – case study
				12- Group Project and Presentation

Attainment of POs through Cos												
Sr No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	0.0	0.0	1.0	0.0	3.0	2.0	3.0	3.0	3.0	3.0	0.0	3.0
CO-2	0.0	0.0	1.0	0.0	3.0	2.0	3.0	3.0	3.0	3.0	0.0	3.0
CO-3	0.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0
CO-4	0.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0
CO-5	0.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	0.0	3.0
Average Score	**0.00**	**1.80**	**2.20**	**1.80**	**3.00**	**2.00**	**3.00**	**3.00**	**3.00**	**3.00**	**0.80**	**3.00**

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

LIFE SKILLS AND EFFECTIVE COMMUNICATION LAB

COURSE CODE: 21B17HS271

COURSE CREDITS:1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Develop attitude and self awareness
2. Learn Self-Motivation and leadership skills
3. Develop communication (writing and speaking) and Listening skills
4. Develop Emotional intelligence and team working ability
5. Develop creativity and critical thinking

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Know your Perception and Attitude	Familiarity

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	Access your Motivation levels and Leadership skills	Assessment
CO-3	Assess EQ and Team work	Assessment
CO-4	Develop effective communication and listening skills	Usage
CO-5	Enhance critical thinking	Usage

Subject Code		**Semester**	2
Subject Name	Life Skill and Effective Communication lab		
Credits	01	**Contact Hours**	28
Course Coordinator	Dr Tanu Sharma		

Course Content

GD Activities	Topc	Activities =language lab and GD	Hours	Evaluation
1	Self-awareness	a)MBTI- Personality Test ---Measure, Assessment, Discussion b)Video on Personality Development --- Discussion and Reporting	2	5
2	Being Emotionally Intelligent	Emotional Intelligent Test --- Measure, Assessment, Discussion Talk by Daniel Goleman https://youtu.be/0yGNhCaKJKk https://youtu.be/FKjj1tNcbtM ---- Discussion and Reporting	2	5
3	Group Dynamics	Group activity – Desert Island	2	
4	Leadership and Team Management	Team Building Activities/ Case study / Role play on leadership https://wikispaces.psu.edu/display/PSYCH484/Goal+Setting+Case+Study Discussion, analysis, and assessment	2	5

Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)
IQAC

5	Creative and Critical Thinking	Creativity Quotient – Measure and Discussion a)The Research Response Exercise- Take the following argument:-*Pesticides harm the environment more than they're worth.* b) Make An "Argument Map" Read about how leaders face and resolve challenges- Report submission	2	5
6	Effective Communication	a)Advanced Phrasal verbs b)Advanced Past perfect **\ Software: Tense Buster**	2	
7	Non –Verbal Communication	Role Play on Body Language How to kill your body language Frankenstein (Run time: 16:36 mins) - Discussion, analysis, Role Play, Reporting	2	5
8	Listening skills	a) A Case for Active Listening Jason Chare at TED Tokyo teachers (Run time 15:24 mins.) Discussion, Analysis and reporting b) https://agendaweb.org/listening/audio-activities-5.html Audio activity – Notting Hill Scene 1		5
9	Etiquettes and Manners	https://youtu.be/LR1TroBTlwA, https://youtu.be/svzTEUxs3A8 Discussion and reporting		5
10		a) Shashi Tharoor (Run time:19:22 mins.) Discussion , analysis and reporting b) https://www.skillsconverged.com/FreeTrainingMaterials/tabid/258/articleType/CategoryView/categoryId/140/Persuasion-Skills.aspx		

Assistant Registrar (Academic)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT • AGOLDHA

	Persuasive Communication				
11	Group vise activities : Groups made according to diagnostic Test -		**Group 1 – and Group 2** a) Intermediate - <u>The Passive</u> b)Intermediate- <u>Question Tags</u> Software: Tense Buster **Group 3 and Group 4** a)Speaking Exercise -GD / brainstorming	1 1 2	
12	Group vise activities : Groups made according to diagnostic Test		**Group 1 – and Group 2** a)Intermediate <u>Equality</u> Case study b) Intermediate <u>Relative Clauses</u> Software: Tense Buster **Group 3 and Group 4** Case study on Team building	1 1 2	

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
WAKNAGHAT

13	Group vise activities : Groups made according to diagnostic Test	Group 1, Group2, Group3, Group4 a)Team work and Group Activities where Group 4 Members take the leadership/ Mentor Roles b) Technical writing Exercises Notices Correspondences – Email writing and Letter writing Job Description Social Media Profiles	1 1	10
14	Group vise activities : Groups made according to diagnostic Test	Group 1, Group2, Group3, Group4 Presentations	2	15
		Total	28	60

Methodology

The course follows a lab-based teaching-learning method with classroom discussions and activities on fundamental concepts of grammar with a strong emphasis on skill development of students with regard to speaking, writing, logically interpreting ideas into words and reasoning in the classroom. The exercises are solved by the students on the software and the marking is automatically shown.

Suggested Reference Books and Readings

1. https://www.hugheseducation.com/blogs/5-leadership-lessons-from-business-tycoon-ratan-tata

2.Leading the team you always wanted by Casey Paul D

3.The Making of a Manager: What to Do When Everyone Looks to You By Julie Zhuo

4. Think and grow Rich by Napoleon Hill

5. Deliver the right message in conversations, emails, and presentations by Stephanie Overby

6. Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results By Rob Biesenbach

7. Five Stars: The Communication Secrets to Get from Good to Great By Carmine Gallo

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	P-1	20	1 Hour.	Syllabus covered upto T2
2	P-2	20	1.5 Hours	Syllabus covered upto T-3
4	P-3 Teaching Assessment	60	Entire Semester	Based on lab and Gd activities

Attainment of POs through Cos												
Sr No	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	1	1	1	1	1	1	1	1	1	1	1	1

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-2	0	0	0	0	0	0	0	0	0	0	0	0
CO-3	1	1	1	1	1	1	1	1	1	1	1	1
CO-4	1	1	1	1	1	1	1	1	1	1	1	1
CO-5	1	1	1	1	1	1	1	1	1	1	1	1
Average Score	.83	.83	.83	.83	.83	.83	.83	.83	.83	.83	.83	.83

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Intellectual Property Rights and Commercialization

COURSE CODE: 18BIWBT734

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To provide an insight and understanding about different aspects of protection of inventions and research developments
2. Learn about procedures for filling protection through Intellectual Property Rights.
3. To provide scopes of protection of diverse intellectual properties and its commercialization for socio-economic improvement.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To enable students with basic concepts and knowledge of intellectual property rights.	Awarness
CO-2	To apply and execute different types of IP protection in research and academics.	Assessment and technical skills
CO-3	To be capable of tackling issues related to IP and its commercialization	Assessment
CO-4	Able to learn the strategies for effective IP management and commercialization	Analytical skills
CO-5	To apply the knowledge of IPR for the benefit generation and for mass utilization	Usage

Course Contents:

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT, SOLAN (H.P.) INDIA

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT
IQAC

Unit	Contents	Lectures required
1	**Introduction**:Introduction of Intellectual properties and rights conferred . Integration of Intellectual Property, Bioethics and Biosafety for biological and applied sciences in research and academia.	4
2	**Types of IP tools**:Different types of IPR(Patents, copyrights and related rights, Trademark, Tradesecret, Integrated circuit layout, Geographical indications, Traditional knowledge, Industrial designs and PBR) Drafting Patent Application and Documentation Revocation of Patent, Litigation and Infringement Rationale of different IPR ,their mechanism of protection and provisions in Law	10
3	**International Agreements** and Treaties:International IP treaties (Madrid Agreement, Trademark law treaty, Patent Law treaty etc.) WIPO, EPC, WTO, and TRIPS. International agreements relevant to biotechnology-associated IP	8
4	**Commercialization**: Methods of commercialization,Impact of commercialization. Financing	6
5	**IP Management for value addition:** Strategies for IP Management and commercialization. IP audit, IP insurance Bioentreprenuership management	4
6	**Licensing/Assignment** :Types of licensing and modes to carry out, Assignments and its benefits, Compulsory Licensing Commercialization for social and economic prosperity with case studies	8
Total lectures		**42**

Methodology

The course will be covered through lectures, presentations and vedios. Apart from discussions on topics covered through lectures and assignments, students have to carry out research paper analysis.

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

Suggested Text Book(s):

1. Intellectual Property Rights & Copyright By Bouchoux.
2. Intellectual Property Licensing Strategies by Thompson Reuters

Suggested Reference Book(s):

1. Intellectual Property Rights, the WTO and Developing Countries: The TRIPS ...Book by Carlos María Correa
2. Perspectives on Commercializing Innovation
   by F. Scott Kieff (Editor), Troy A. Paredes (Editor

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	1	1	2	2	15
CO-2	2	2	1	2	2	2	1	1	1	1	1	2	1.5
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.7
CO-4	2	2	3	3	2	1	1	1	2	2	2	2	1.9

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC

CO-5	2	2	2	2	2	1	2	1	1	2	1	2	1.6
Average	3.4	3.4	2	2.1	2.1	1.3	1.1	1	1.5	1.6	1.5	2	

CO/PSO	PSO1	PSO2	Average
CO1	2.0	1.0	1.50
CO2	1.0	2.0	1.50
CO3	1.0	2.0	1.50
CO4	2.0	2.0	2.00
CO5	1.0	2.0	1.50

Assistant Registrar (Academics)
Jaypee University of Information Technology
Waknaghat, Distt. Solan (H.P.)

IQAC