Jaypee University of Information Technology, Waknaghat
Department of CSE & IT

Agenda for the Board of Studies Meeting in the departments of CSE and IT
10th June, 2016

Agenda Point-1:

Introduction of new PG Programme in Software System Security, M Tech CSE (SSS).

Proposed by: Departmental Programme Evaluation Committee.

The department of CSE is currently running one M Tech CSE programme. It is proposed to add one more M Tech CSE with specialization in Software Systems Security titled M Tech CSE (SSS) from the academic year starting July 2016. This programme will cater for the requirements of the industry for CSE professionals with specialization in Software Systems Security.
The course will consist of 76 credits with 12 credits coursework in the area of specialization. In addition the project work of 26 credits and seminar work of 4 credits will also be in the area of specialization. The course will have a capacity of 18 students.

Detailed curricula: as under

JES					
Department of CSE & IT					
2 year M Tech CSE (Software System Security) Curricula					
Batch 2016-18 M Tech CSE (SSS) I SEM (M1)					
SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks(Faculty)**
1	CS	Advanced Data Structures	3	3	
2	CS	Advanced Computer Networks	3	3	
3	CS	**Security of Database Systems**	3	3	**Dr Yashwant Singh**
4	CS	**Cryptography and Information System Security**	3	3	**Prof Dr S P Ghrera**
5	CS	Departmental Elective-1(DE-I)	3	3	
6	CS	Software Systems Lab - I	4	2	
		Total	**19**	**17**	
		List of Electives(DE-I)			
		(To be updated from time to time)			

1	CS	Analysis of Algorithms	3	3	
2	CS	Computation Theory and Applications	3	3	
3	CS	Intelligent Systems	3	3	
4	EC	VLSI Circuit and System Design	3	3	
5	CS	Advanced Operating Systems	3	3	
6	CS	Advanced Database Systems	3	3	
7	**CS**	**Cryptanalysis**	3	3	**Dr Vivek Sehgal**
		JES			

2 year M Tech CSE (Software System Security) Curricula

Batch 2016-18 M Tech CSE(SSS) II SEM (M2)

SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1	CS	Advanced Algorithms	3	3	
2	CS	Advanced Software Engineering	3	3	
3	CS	**Cloud System Security**	3	3	**Dr Hemraj Saini**
4	CS	**Digital Forensics**	3	3	**Dr Shailendra Shukla**
5	CS	Departmental Elective-2(DE-II)	3	3	
6	CS	Software Systems Lab - II	4	2	
		Total	**19**	**17**	
		List of Electives(DE-II)			
		(To be updated from time to time)			
1	EC	Advanced Wireless and Mobile Communications Security	3	3	
2	CS	Algorithmic Graph Theory	3	3	
3	EC	Information and Coding Theory	3	3	
4	EC	Digital CMOS design	3	3	
		JES			

2 year M Tech CSE (Software System Security) Curricula

Batch 2016-18 M Tech CSE (SSS) III SEM (M3)

SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1		Departmental Elective-3(DE-III)	3	3	
2		Departmental Elective-4(DE-IV)	3	3	
3	CS	Seminar	0	2	
4	CS	Project, Part -I	24	12	

		Total	**30**	**20**	
		List of Electives(DE-III/IV)			
		(To be updated from time to time)			
1	CS	**Information and Network Security**	3	3	**Prof Dr S P Ghrera**
2	CS	**Security Risk Analysis**	3	3	**Dr Hemraj Saini**
3	CS	**Penetration Testing**	3	3	**Dr Pradeep Kumar**
4	CS	**Secure Enterprise Computing**	3	3	**Dr Rajni Mohana**
5	CS	**Control Systems Security**	3	3	**Dr Shailendra Shukla**
6	CS	**Secure Software Design**	3	3	**Dr Pradeep K Singh**
		JES			

2 year M Tech Curricula for Computer Science Engineering

Batch 2007-09 M Tech IV semester (M4)

SN	**Sub Code**	**Subject**	**Contact hours**	**Credits**	**Remarks**
1		Departmental Elective-5(DE-V)	3	3	
2		Departmental Elective-6(DE-VI)	3	3	
3	CS	Project Seminar	0	2	
4	CS	Project, Part -II	28	14	
		Total	**34**	**22**	
		List of Electives(DE-V/VI)			
		(To be updated from time to time)			
1	**CS**	**Security Design & Architecture**	3	3	**Prof Dr S P Ghrera**
2	**CS**	**Threat & Vulnerability Analysis**	3	3	**Dr Hemraj Saini**
3	**CS**	**Incident Response & Event Management**	3	3	**Dr Pradeep Kumar**
4	**CS**	**Security Scripting**	3	3	**Dr Rajni Mohana**
5	**CS**	**Cyber Warfare & Cyber Crime**	3	3	**Dr Shailendra Shukla**
6	**CS**	**Security investigation**	3	3	**Dr Pradeep K Singh**

Agenda Point-2:

Introduction of new Course "Cryptography and Information System Security" (161WCI122) M Tech CSE (SSS).
Proposed by: Prof Dr S P Ghrera, Course Coordinator.
Course Description: as under.

16M21CI122: Cryptography and Information System Security

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)**
Class: **M Tech CSE and M Tech CSE(SSS)**
Course Structure: 3 Credits(3L)

Prerequisites: Computer Networks

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 hierarchy.
11. Learn futuristic cryptographic techniques like Elliptic Curve and quantum cryptography.
12. Learn the concept of trusted computing.
13. Learn the Web security Protocol.
14. Learn the legal 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.
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 Steganograhpy)	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 socket layer and transport layer security, secure e-transaction.	16,17	4
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
Attendance, Assignments etc	25(quiz=12, Assignment=9, Regularity=4)
Total	100

CO-PO MAPPING											
Course outcomes (16M21CI122 Cryptography and Information System Security)	**Level of Attainment**	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**Weightage**
1. Understand the basic security services e.g. Authentication, Access Control, Confidentiality, Integrity, and Non repudiation.[Familiarity]	Familiarity	H	M	L	H	M	M	M	M	M	64.44
2. Understand the concepts of risk, threats, vulnerabilities and attack. [Familiarity]	Familiarity	H	M	L	M	M	H	L	H	H	73.33
3. Know the important ethical and legal issues to consider in computer security. [Familiarity]	Usage	M	M	H	L	M	M	H	M	M	68.89
4. Know the goals of end-to-end data security. [Familiarity]	Usage	M	H	H	H	M	H	M	H	M	73.33
5. Understand the role of random numbers and prime numbers in security. [Assessment]	Usage	H	M	H	L	M	H	H	M	H	68.89
6. Learn standard symmetric encryption algorithms. [Assessment]	Assessment	H	M	L	L	M	M	M	H	M	73.33
7. Learn the architecture for public and private key cryptography and how public key infrastructure (PKI) supports network security. [Assessment]	Assessment	H	H	H	H	M	M	L	H	H	82.22
8. Learn the methods of digital signature and encryption. [Assessment]	Assessment	H	M	L	L	M	L	M	M	H	64.44
9. Learn key management and how key exchange protocols work. [Familiarity]	Assessment	H	M	H	M	M	M	L	M	M	82.22
10. Learn security protocols at different layers of Network layer hierarchy. [Assessment]	Assessment	H	H	M	H	M	L	H	H	H	77.78
11. Learn futuristic cryptographic techniques like Elliptic Curve and quantum cryptography. [Assessment]	Assessment	M	M	L	M	M	H	H	M	M	64.44
12. Learn the concept of trusted computing. [Assessment]	Assessment	H	M	M	L	M	L	M	M	H	77.78
13. Learn the Web security Protocol. [Assessment]	Assessment	H	H	H	H	M	H	M	H	M	73.33
Application Objectives											
1. Apply appropriate known cryptographic techniques for a given scenario. [Usage]	Usage	H	M	H	M	M	H	M	M	H	82.22
2. Analyze the tradeoffs of balancing key security properties.[Usage]	Usage	H	M	H	M	H	M	M	H	M	73.33
3. Design a security solution and do the cryptanalysis. [Usage]	Usage	M	H	M	H	M	H	H	M	H	68.89
Weightage		90	72.5	67.5	80	62.5	75	82.5	60	67.5	

Agenda Point-3:

Introduction of new Course "Security of Database Systems" (16M21CI121) M Tech CSE (SSS).
Proposed by: Dr Yashwant Singh, Course Coordinator
Course Description: as under.

16M21CI121: Security of Database Systems

Course Coordinator:	Dr Yashwant Singh
Class:	M Tech CSE and M Tech CSE (SSS)
Prerequisites:	Database Systems
Course Credits:	3 (3-0-0)
Session:	Aug – Dec, 2016

Description & Rationale:

The course provides a strong foundation in database security and auditing. This course utilizes Oracle scenarios and step-by-step examples. The following topics are covered: security, profiles, password policies, privileges and roles, Virtual Private Databases, and auditing. The course also covers advanced topics such as SQL injection, database management security issues such as securing the DBMS, enforcing access controls, and related issues

Learning Outcome:

The objective we share in this course is that each student understand the application of security concepts to database technology and demonstrate the ability to work hands-on.

Specific topic objectives are:

- Understand the fundamentals of security, and how it relates to information systems
- Identify assets in your organization and their values
- Identify risks and vulnerabilities in operating systems from a database perspective
- Learn good password policies, and techniques to secure passwords in your organization
- Learn and implement administration policies for users
- Use Oracle to create policies, profiles and roles
- Understand the various database security models and their advantages or disadvantages
- Learn how to implement a Virtual Private Database using views, roles, and application
- Context Gain an overview of auditing fundamentals, and create your own auditing model
- Learn the purpose and use of data dictionaries, encryption and SQL injection
- Explore an interesting research topic of your choice related to database security

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:

Database Systems, or equivalent (basic understanding on Oracle SQL and SQL script).

Tools and Technologies:

You need a high performance laptop/computer that can run Oracle database Enterprise Edition (9i, 10g or 11g).

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	35	2 hours	Syllabus covered upto Test-3
3.	Project/Assignments, Quizzes, Attendance	25	Entire Semester	Assignment -12 Quizzes -9 Attendance - 4

Project Evaluation Criteria:

The term project should explore or present original material in database security. You may choose your own project topic or choose from a selected topic. We will be discussing project topics in class, after which you will submit the topic you want to explore. Project topics are subject to instructor approval. The following characteristics will be used to grade the term project:

- Application of basic security concepts to the specific topic
- Demonstrated understanding of technologies involved
- Proper academic formatting including table of contents, abstract
- Describe methodology
- Comprehensiveness and depth
- Demonstrates technology
- Regulations and standards
- Helpful contrasts
- Coherent
- References in proper format

Course Contents:

S.No.	Topics	No of Lectures	Reading (Afyouni)
1	Introduction Course Overview	1	
2	Security Concepts Discussion Security Architecture	3	Chapter-1
3	Operating System Security	3	Chapter-2
4	Term Project Discussion	2	
5	User Creation and Administration	4	Chapter-3
6	Profiles, Passwords, Privileges, and Roles	3	Chapter-4
7	Security Models for Database Applications	3	Chapter-5
8	Virtual Private Databases	3	Chapter-6
9	Database Auditing Models	3	Chapter-7
10	Application and Data Auditing	3	Chapter-8
11	Auditing Database Activities	3	Chapter-9
12	Security and Auditing Project Cases	3	Chapter-10
13	Advanced topics	3	
14	Term Project Presentations Final Review	5	
	Total	**42**	

Text Book(s):

Database Security and Auditing: Protecting Data Integrity and Accessibility by Hassan A. Afyouni Publisher: Course Technology; 1 edition (April 6, 2005) ISBN-10: 0619215593 ISBN-13: 978-0619215590

Optional Book(s):

Effective Oracle Database 10g Security by Design by David C. Knox Publisher: McGraw-Hill Osborne (Oracle Press)

Course Outcomes (Security of Database Systems (16M21CI121))	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 understand the fundamentals of security, and how it relates to information systems	Familiarity	H	H	H	M	M	H	H	H	M	M	87%
2. To explore and identify assets in your organization and their values	Familiarity	H	H	H	M	M	H	H	H	M	H	90%
3. To assess and identify risks and vulnerabilities in operating systems from a database perspective	Usage	H	H	H	M	M	H	M	H	M	H	87%
4. To Learn good password policies, and techniques to secure passwords in your organization	Usage	H	H	H	M	M	H	H	M	H	H	90%
5. To Learn and implement administration policies for users	Usage	H	H	H	M	H	M	H	M	M	M	83%
6. To Use Oracle to create policies, profiles and roles	Assessment	H	H	H	H	M	H	H	M	M	M	87%
7. To understand the various database security models and their advantages or disadvantages	Assessment	H	H	H	M	M	H	H	H	H	M	90%
8. To learn how to implement a Virtual Private Database using views, roles, and application	Assessment	H	H	H	H	M	H	H	H	M	H	93%
9. To gain an overview of auditing fundamentals, and create your own auditing model	Assessment	H	H	H	M	M	H	H	H	M	M	87%
Weightage		100 %	100 %	100 %	74 %	70 %	6 %	96 %	89 %	4 %	82 %	

Agenda Point-4:

Introduction of new Course "Cryptanalysis" (16M21CI123) M Tech CSE (SSS).
Proposed by: Dr Vevek Sehgal, Course Coordinator
Course Description: as under.

Cryptanalysis

Course Coordinator: **Dr. Vivek Kumar Sehgal**
Class: **M Tech CSE and M Tech CSE(SSS)**
Course Structure: 3 Credits (3L)
Prerequisites: Cryptography and Information System Security, Algebra, Algorithms
Objectives:

1. To understand the Modern concepts of cryptography.
2. Revisiting elementary number theory and algebra background.
3. Learn the Sieve algorithms
4. Learn the Brute force cryptanalysis
5. Learn the Birthday-based algorithms for functions
6. To understand Fourier and Hadamard-Walsh transforms
7. Learn the Lattice reduction.
8. To understand Polynomial systems and Grobner base computations
9. Learn the Lattice-based cryptanalysis
10. Learn the Elliptic curves and pairings
11. To understand Index calculus algorithms

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

1. Student will able to understand this course related to cryptography is cryptanalysis, defined as the science of interpreting cipher text. These two disciplines combined form the science of cryptology.
2. The cryptographer's goal is to provide security for information by developing strong cryptosystems, after this course students may discover weaknesses or flaws in cryptosystems and break the security provided by those systems.
3. To perform an important role in evaluating and corroborating the strength of cryptosystems. In fact, cryptosystems are generally not considered secure until they withstand significant cryptanalysis.

4. To use powerful computing equipment and a variety of procedures, processes, and techniques to launch attacks against cryptosystems. In fact, a good cryptanalyst can even determine plaintext from samples of cipher text without even knowing the cipher that was used to produce it.
5. Students can use cryptanalysis techniques as part of their attacks against cryptography-based security systems. When properly implemented, standard cryptography-based security technologies can provide ample protection against a wide range of attacks, including common cryptanalysis techniques.

Course Outline:

S. No.	Topics	Chapter	Lectures
1	A bird's-eye view of modern cryptography	1	3
2	Elementary number theory and algebra background	2	3
3	Linear algebra	3	2
4	Sieve algorithms	4	3
5	Brute force cryptanalysis	5	3
6	The birthday paradox: Sorting or not?	6	3
7	Birthday-based algorithms for functions	7	3
8	Birthday attacks through quadrisection	8	3
9	Fourier and Hadamard-Walsh transforms	9	3
10	Lattice reduction	10	2
11	Polynomial systems and Grobner base computations	11	3
12	Attacks on stream ciphers	12	3
13	Lattice-based cryptanalyst	13	3
14	Elliptic curves and pairings	14	3
15	Index calculus algorithms	15	3
	Total		43

Text book

1. Joux, Antoine. Algorithmic cryptanalysis. CRC Press, 2009.

Reference books:

2. Courtois, Nicolas T., and Gregory V. Bard. "Algebraic cryptanalysis of the data encryption standard." In Cryptography and Coding, pp. 152-169. Springer Berlin Heidelberg, 2007.
3. Biham, Eli, and Adi Shamir. Differential cryptanalysis of the data encryption standard. Springer Science & Business Media, 2012.
4. Wagstaff Jr, Samuel S. Cryptanalysis of number theoretic ciphers. CRC Press, 2002.

Stand-alone tools:

- **GAP** This computer algebra system is developed by the GAP group, its home page is http://www.gap-system.org/. It includes many features and offers very useful group theoretic algorithms. In particular, it is able to manipulate group characters and group representation.

- **MAGMA** Magma is a computer algebra system that can be bought online at http://magma.maths.usyd.edu.au/. An online calculator, with limited computing power, is also available. The Magma language is mathematically oriented and every object belongs to a rigorously defined structure. Magma includes a large number of features. In particular, it offers algebraic geometry tools and knows how to compute with elliptic curves and divisors. Magma also contains a fast implementation of F4 Grobner basis algorithm and lattice reduction tools.
- **Maple** Maple computer algebra is a very well-known and versatile system, used in a large variety of applications. The current version contains a very efficient implementation of the F5 Grobner basis algorithm.
- **PARI/GP** This computer algebra system was initiated by Henri Cohen and is currently maintained by Karim Belabas under the GPL license. It offers both a stand-alone tool and a C library. In addition to classical features such as modular computation, linear algebra, polynomials, it offers some specific functionalities to compute information about general number fields and elliptic curves over the complex field. For more information, look up the webpage at http://pari.math.u-bordeaux.fr/
- **SAGE** Sage is an open-source mathematics software system http: //www.sagemath.org/ based on the Python language. It incorporates many efficient implementations of algorithms for algebra. One specificity of Sage is that it offers the option of interfacing with other computer algebra systems and of incorporating functionalities from existing libraries.

Evaluation Scheme:

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

CO-PO MAPPING

Course outcomes (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, and 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. TheThumbInstructionSet: 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%
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, such as 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%
Weightage		100	98	98	64	64	92	90	82	61	80	

Agenda Point-5:

To consider approval of the recommendations of PEC report and the action taken on the recommendations (10th August, 2015)

Point No 1: To discuss the assessment of the PEO's (Program Educational Objectives) for Bachelor of Technology in Computer Science & Engineering.

Point No 2: To discuss the assessment of the PEO's (Program Educational Objectives) for Bachelor of Technology in Information Technology.

Point No 3: To discuss the modification in different course curricula, course and project management schemes to fully achieve PEO's (Program Educational Objectives of B. Tech CSE and B. Tech IT programme.

Discussions:

Point No 1: The committee examined the feedback received from various stakeholders like students, parents and employers from industry and academia and assessed the achievement of PEO's (Program Educational Objectives of B Tech CSE programme on a scale of 100. The results of evaluation are given below:

Program Educational Objectives-CSE

Sr No	PEOs	Assessment in %age
1	Engineering Ethos: To bring the physical, analytical and computational approaches of CSE to bear on the challenges they take on, abstracting essential structure, recognizing sources of uncertainty, and applying appropriate models, technical tools, and evaluations to develop their solutions.	90
2	Leadership: To bring to their careers the self-assurance, integrity, and technical strengths that drive innovation and the communication and collaboration skills to inspire and guide the groups they work with in bringing their ideas to fruition.	95
3	Versatility: To develop abilities and talents leading to creativity and productivity in fields and professions beyond the regular CSE curriculum.	90
4	Engagement: To promote life-long self learning abilities to remain professionally effective to the society at large.	90
5	Diversification: To promote among student graduates the ability to gain multidisciplinary knowledge through projects and industrial training, leading to a sustainable competitive edge in R&D and meeting societal needs.	80
6	Projects: To inculcate group work and team management skills with cross-cultural etiquettes, promoting knowledge transfer leading to conceptualization and delivery of projects with varied complexity.	80
7	Ethics and Attitudes: To sensitize students towards issues of social relevance, openness to other international cultures and to introduce them to professional ethics and practice.	95

Point No 2: The committee examined the feedback received from various stakeholders like students, parents and employers from industry and academia and assessed the achievement of PEO's (Program Educational Objectives of B Tech IT programme on a scale of 100. The results of evaluation are given below:

Program Educational Objectives-IT

Sr No	PEOs	Assessment in %age
1	To provide student graduates with a solid foundation in mathematical, scientific and engineering fundamentals required to develop problem solving ability.	95
2	To prepare student graduates for a successful career with effective communication skills, teamwork skills and work with values that meet the diversified needs of industry, academia and research.	85
3	To train students in comprehending, analyzing, designing and creating novel products and technologies that provide solution frameworks to real world problems.	90
4	To promote awareness among student graduates towards issues of social relevance and introduce them to professional ethics and practice.	90
5	To inculcate in student graduates the ability to gain multidisciplinary knowledge through projects and industrial training, providing a sustainable competitive edge in R&D and meeting industry needs.	80
6	To develop self-learning ability in graduates by inculcating the philosophy to continuously learn, innovate and contribute to creation of new knowledge for the benefit of the society at large.	95
7	To inculcate in graduates the qualities of leadership for technology innovation and entrepreneurship.	95

Point No 3: The committee considered the modification of syllabus in respect of following courses

(i) Big Data Analytics
(ii) Mobile Computing
(iii) Web Application Engineering
(iv) ARM based Embedded System Design
(v) Information Retrieval & Data Mining

The details of the modified syllabus for the above courses are given respectively as below:

15B1WCI833: Big Data Analytics

REVISED COURSE DESCRIPTION

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:

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:

Sr No	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 Rank, Topic-Sensitive Page Rank, Link Spam, Hubs and Authorities**	5
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

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

CO-PO MAPPING											
Course outcomes (15B1WCI833) Big Data Analytics	**Level of Attainment**	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**Weightage**
1. Understand the basics of big data: Origination and sources, storage and processing requirements	Familiarity	H	M	L	H	M	M	M	M	M	64.44
2. Understand map reduce framework and distributed framework	Familiarity	H	M	L	M	M	H	L	H	H	73.33
3. Understand the basics of streams, Sampling Data in a Stream and Filtering Streams	Usage	M	M	H	L	M	M	H	M	M	68.89
4. Know the basics of Link Analysis	Usage	M	H	H	H	M	H	M	H	M	73.33
5. Understand the role of page rank and HITS in Antispam process	Usage	H	M	H	L	M	H	H	M	H	68.89
6. Learn association rule mining from big data	Assessment	H	M	L	L	M	M	M	H	M	73.33
7. Learn clustering from the big data	Assessment	H	H	H	H	M	M	L	H	H	82.22
8. Learn Mining of Social Network Graphs	Assessment	H	M	L	L	M	L	M	M	H	64.44
9. Learn Clustering of Social-Network Graphs	Assessment	H	M	H	M	M	M	L	M	M	82.22
10. Learn to Find Overlapping Communities	Assessment	H	H	M	H	M	L	H	H	H	77.78
11. Learn Neighborhood properties of Graph	Assessment	M	M	L	M	M	H	H	M	M	64.44
12. Learn the concept of Recommendation Systems	Assessment	H	M	M	L	M	L	M	M	H	77.78
13. Learn the concept of collaborative filtering	Assessment	H	H	H	H	M	H	M	H	M	73.33
Application Objectives											
1. Apply appropriate known analysis techniques for a given scenario. [Usage]	Usage	H	M	H	M	M	H	M	M	H	82.22
2. Analyze the tradeoffs of Granularity and Parallel processing	Usage	H	M	H	M	H	M	M	H	M	73.33
3. Design Association Rule Mining Algorithm for Shopping Mall Basket	Usage	M	H	M	H	M	H	H	M	H	68.89
Weightage		90	72.5	67.5	80	62.5	75	82.5	60	67.5	

15B1WCI731: Mobile Computing

REVISED COURSE DESCRIPTION

Class: B. Tech CSE VII
Course Credits: 3 Credits (3L)
Prerequisites: Java Programming, Computer Networks, Operating Systems
Course Coordinator: Ms. Nishtha Ahuja

Objectives:

1. Program and configure mobile devices and networks.
2. Enable them to develop new and exciting applications for existing and emerging hardware technology.
3. Equip students on the fundamentals of mobile computing and the design mobile services.
4. Learn the issues in mobile computing and communications from the hard- ware and software perspective.
5. Understand the mobile IP stack and mobile web access, technologies and services.

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

1. Learn about 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 Ad hoc 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.

Course Text:

Textbooks:

1) Beginning Android Application Development by Wei-Meng Lee, Wiley Publication
2) Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition 2002.

Course Outline:

S No	Chapter	Lectures	Chapter
1.	Introduction to Ubiquitous Computing	2	

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	10	Book 1 1 1 2 2 2 3,4 6 8 8 9 9
3.	Basic Principles and Concepts in Mobile Computing • Wireless Communication Technology • B. Radio-based Communication	4	Book 2 Chapter 1
4.	The Concept of Wireless LAN, PAN, Mobile Networks and Sensor Networks • WLAN (e.g. IEEE 802.11 Family Network) • PAN (e.g. Bluetooth Network) • C. Mobile Phone Networks	6	Book 2 Chapter 2
6.	Mobility Management and Mobile IP • Location Management • Location Update Algorithms • Paging Schemes, Handoff and Roaming Management • D. Operation of Mobile IP & DHCP for Mobility	6	Book 2 Chapter 12
7.	Case Studies on Location-based Services and Applications • Location Estimation Systems and its Applications • Short Message Services (SMS) • Multimedia Message Services (MMS) • D. Location Based Services	8	
8.	MANET	2	
9.	Student presentations on Emerging New Technologies in Mobile Computing Area	4	
	Total	**42**	

Evaluation Scheme:

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

CO-PO MAPPING											
Course outcomes (Mobile Computing)	**Level of Attainment**	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**Weightage**
1. Learn about technologies of pervasive computing	Familiarity	H	M	H	M	M	H	H	H	H	89.00
2. Acquire solid knowledge on mobile networks and mobile computing	Familiarity	H	H	H	M	M	H	H	H	H	92.00
3. Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts	Usage	H	H	H	H	H	H	H	H	H	100.00
4. Understand the concepts of Ad hoc and wireless sensor networks	Assessment	H	H	H	M	H	H	M	H	M	96.00
5. Understand the concepts of Mobile IP.	Assessment	H	H	H	H	M	H	H	H	M	92.00
6. To be able to analyze the performance of different handoff, roaming, and location update algorithms for cellular networks.	Assessment	M	H	H	H	H	M	H	H	H	92.00
7. Awareness of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior.	Familiarity	H	M	M	H	H	H	H	H	M	89.00
8. Describe the possible future of mobile computing technologies and applications.	Familiarity	H	M	M	M	M	H	H	H	H	85.00
Application Objectives											
1. Design and implement mobile applications to realize location-aware computing	Usage	H	M	H	M	M	H	M	M	H	82.22
2. Design algorithms for location estimations based on different positioning techniques and platforms	Usage	H	M	H	M	H	M	M	H	M	73.33
3. Acquire the knowledge to administrate and to maintain a Wireless LAN	Usage	M	H	M	H	M	H	H	M	H	68.89
Weightage (% age)		94	85	91	82	82	94	91	94	88	

15B1WCI731: Web Application Engineering

REVISED COURSE DESCRIPTION

Course Credits: 4 (3-1-0)
Branch and Semester: IT – 5th Semester
Session: July – December, 2016
Faculty Coordinator: Dr. Amit Kumar Singh

Introduction:

This course involves study of the necessary theoretical foundations to design and develop state-of-the art web applications. Next to the technical aspects to develop applications for the web, business aspects are covered with the most common business models and explained with real-world examples.

The course will be supplemented by a separate Lab course in which the students learn how to design a good web site using the web technology tools (HTML, CSS, JavaScript, DHTML, XML and PHP). Technical aspects for the development of web applications are presented along with generic platforms and architectures. Students participating in the exercise apply this knowledge in individual projects that cover all aspects from the lecture/lab with the design and development of a web application. Students are strongly encouraged to participate actively in class discussions.

Pre-requisites: Introduction to Computer Programming
DBMS (Those who are simultaneously registered in DBMS can also take this course)

Objective: To develop the ability to design and implement web enabled applications.

Learning Outcome:

- The student shall acquire the skill to design and develop web based applications with high usability, scalability and efficiency.
- They shall be exposed to various technologies required to design web sites
- They shall acquire the skill to choose the technology to use based on the requirements and functionality of the web site.

Course contents:

S. N.	Topic	L
1	HTML and its markup tags, HTML Frames, Tables, Images and Forms, **HTML5 & its features such as HTML graphics and Media, Website Development Processes**	3
2	Concepts of Internet including **TCP & UDP**, WWW, HTTP, FTP, **SMTP** and Web Server Basics	2
3	Web Applications, Application server, Basic Web Architectures, Security, Performance of web applications	2
4	Cascading Style Sheets **& its latest standard, Responsive Web Design**	3
5	Concepts of IP addressing and system design	3

6	Working principle of search engines and **Meta search engine**, web crawlers, concept of index and inverted index.	2
7	Compression on Web	3
8	Client Side Scripting Technology-Java Scrip**, JavaScript Window - The Browser Object Model**	6
9	Basics of XML and components of XML Documents, Creating markup with XML	2
10	Defining structure of XML Documents using Document Type Definition (DTD)	3
11	Giving Structure to XML Documents by Schema Definition Language	3
12	XML Technologies-XSLT, XQUERY and XPATH expressions, XML Documents processing using DOM	3
13	PHP, **PHP – XML, PHP - AJAX**	8
14	MYSQL Database Connectivity	2
	Total Hours	**45**

Evaluation Scheme:

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

Text Book(s) / Reference Book(s) :

1. Web Enabled commercial Application development using HTML,DHTML, Java Script, Perl CGI" by Ivan Bayross, BPB Publication
2. Internet and World Wide Web – How to Program" by Deitel, Deitel and Nieto ,Pearson Education Asia Publication
3. Learning WML, and WMLScript **Programming the Wireless Web**" By Martin Frost, Oreilly
4. Getting Started with WAP and WML" by Huw Evans , Paul Ashworth ,SYBEX publications
5. PHP and MYSQL Manual" by Simon Stobart and Mike Vassileiou
6. PHP and MYSQL Web Development" by Luke Welling and Laura Thomson(Pearson Education
7. PHP 5 Unleashed" by John Coggeshall.
8. The XML Bible", by Elliotte Rusty Harold
9. SVG Essentials", by J. David Eisenberg, Orielly
10. Step by Step XML" by Michael J. Young Prentice Hall Of India
11. XML How to Programme" Deitel Pearson Edition
12. XML Hand Book" 3rd Edition Pearson Edition
13. Java2D Graphics By Jonathan Knudsen First Edition May 1999 By Oreilly
14. Killer Game Programming in Java By Andrew Davison
15. **Beginning Java Game programming Joel Fan, Eric Ries,Calin Tenitchi**
16. Developing Online Games: An Insider's Guide by Jessica Mulligan, Bridgette Patrovsky: New Riders Practical Java Game Programming (Game Development Series) by Dustin Clingman, Shawn Kendall , Syrus Mesdaghi

CO-PO MAPPING												
Course outcomes (Web Applications Engineering	**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 learn broaden your knowledge of networks, WWW, Internet, URL, DNS, Web browsers, Web Servers and Protocols.	Familiarity	H	H	M	L	M	H	H	M	H	H	70%
2. You will become aware of the benefits and future of Web Applications.	Familiarity	H	H	H	L	L	H	H	H	M	H	85%
3. You will increase your proficiency in Scripting languages.	Computational skills	H	H	H	L	M	H	M	H	M	H	90%
4. You will know the Web Architectures and how a Web client-server interaction happens.	Assessment	H	H	H	H	M	M	H	M	M	H	70%
5. You will Know the Website Development Processes	Technical skills	H	H	H	M	M	M	M	M	M	H	73%
6. You will know how a search engine and Meta search engine works and advantages and disadvantages of Meta search engine over a search engine.	Familiarity	H	H	H	H	M	H	H	M	M	H	75%
7. To develop and implement client side and server side language programs that meet stated specifications	Assessment	H	H	H	H	M	H	H	M	M	M	90%
8. To develop and implement, and demonstrate Database Driven Websites through a project that meet stated specifications.	Assessment	H	H	H	M	M	H	H	H	M	H	95%
Weightage		100 %	96 %	96 %	96 %	70 %	95 %	95 %	81 %	70 %	95 %	

ARM based Embedded System Design (13B1WCI731)

REVISED_COURSE DESCRIPTION

Course Credit: 3
Semester: 7
Course Coordinator: Dr Vivek Sehgal

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 tool chain 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)
7. Ability to use a computer to prepare written reports and to perform basic data reduction, graphing, and engineering data presentation.

Application objectives:

Topic(s)

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)

1. C/C++ Programing
2. Assembly programing
3. Computer architecture
4. Digital design

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

Course Topics:

Week	Topics to be covered	No. of 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	**Arm based Development boards for Embedded system design**	2
11	**Migration from 32 to 64-bit architecture**	2
12	**Big Little Clustered Architecture**	2
13	**Compatible IP Cores with 64-bit ARM architecture**	2

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:

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

CO-PO MAPPING

Course outcomes (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, and 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. TheThumbInstructionSet: 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%
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, such as 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%
Weightage		100	98	98	64	64	92	90	82	61	80	

Information Retreival and Data Mining (11B1WCI832)

REVISED_COURSE DESCRIPTION

Course Name: Information Retrieval and Data Mining
Course Code: 11B1WCI832
Course Credits: 3
Faculty Coordinator: Dr Sakshi Babbar

Introduction

Data Mining studies algorithms and computational paradigms that allow computers to find *patterns* and *regularities* in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. It is currently regarded as the key element of a more general process called *Knowledge Discovery* that deals with extracting useful knowledge from raw data. The knowledge discovery process includes data selection, cleaning, coding, using different statistical, pattern recognition and machine learning techniques, and reporting and visualization of the generated structures. This course will offer a comprehensive coverage of well known Data Mining topics including *classification, clustering* and *association rules*. A number of specific algorithms and techniques under each category will be discussed. Methods for *feature selection*, *dimensionality reduction* and *performance evaluation* will also be covered. Students will learn and work with appropriate software tools and packages in the laboratory. They will be exposed to relevant Data Mining research.

Course Objectives

1. To introduce students to the basic concepts and techniques of Data Mining
2. Students will learn how to categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, prediction and cluster analysis.
3. Learning performance evaluation for different data mining algorithms on real data sets.
4. To develop skills of using recent data mining software for solving practical problems.

Course Outline

Unit 1: Overview of Data Mining
This unit provides some background on data objects and statistical concepts. It also discusses the type of data to be mined and presents a general classification of data-mining tasks.
Unit 2: Data Preprocessing
This unit introduces techniques for preprocessing data before mining. Concepts such as data cleaning, data integration, data reduction, data transformation, and data discretization will be discussed.
Unit 3: Visualization Techniques
Students will learn how to reveal relationship that exist among attributes of a given data set using visualization tools such as: graphs, tables, histograms, bar charts, box charts, scatter plots, Gaussian

distribution function and more on real data sets.

Unit 4: Dimensionality Reduction

Basic concepts and applications of Principle Component Analysis (PCA)

Unit 5: Mining Frequent Patterns, Associations, and Correlations

This unit presents methods for mining frequent patterns, associations, and correlations.

Unit 6: Classification

This unit discusses methods such as decision tree induction, Bayesian classification, rule-based classification, neural networks, support vector machines, associative classification and k-nearest neighbor classifier

Unit 7: Cluster Analysis

This unit describes methods for data clustering. Several major data-clustering approaches, such as partitioning methods, hierarchical methods, density-based methods, grid-based methods, and model-based methods will be discussed.

Unit 8: Outlier detection

This unit describes methods for anomaly detection. Several major approaches, such as statistical approaches, proximity-based approaches, clustering-based approaches, and classification-based approaches will be discussed

Evaluation Scheme:

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

Textbooks

1. **Introduction to Data Mining**

   Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education (Addison Wesley), 0-321-32136-7, 2006

2. **Mining of 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

CO-PO MAPPING												
Course outcomes (_Information Retreival and Data Mining (11B1WCI832)	**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. Overview of **Information Systems**, Information System Architecture, Classification of Information Systems, Functional Area Application, case studies on Requirement Analysis of Information systems, Overview of Information System Content Management Environments e.g. Drupal and introduction to Servlets and JSP	Familiarity	H	M	M	L	L	H	H	M	L	H	70
2. **Overview of Data Mining** (includes introductory concepts of data mining, why data mining and introductory statistical concepts)	Familiarity	H	H	H	L	L	M	M	H	M	H	76.67
3. Introduction and Understanding **Data preprocessing task** (includes data cleaning, data integration, data reduction, data transformation and data discretization)	Usage	H	H	M	L	M	H	L	H	L	H	73.33
4. **Learning Visualization Techniques** (learning visualization tools such as graphs, tables, histograms, bar charts, scatter plots, plotting Gaussian distribution function and more)	Usage	H	H	M	M	M	M	H	L	L	L	66.67
5. Understanding what is **Frequent Pattern Mining**, Why it is useful and how to do reveal association and correlation present in the data set. Understanding frequent pattern mining algorithms	Usage	H	H	H	L	M	M	M	L	L	M	66.67
6. Learning **Predictive Data Mining tasks** (classification, support vector machines and regression). Understanding various types of classifier (for eg. Bayesian, Naïve, Decision trees, k-nearest neighbor and rule based)	Usage	H	H	M	M	L	H	H	L	M	H	76.67
7. Understanding **Clustering**. How it is different from classification? When to apply clustering? Learning data clustering approaches such as: partitioning based, density based, hierarchical methods and model based.	Usage	H	M	M	H	M	M	H	L	M	M	73.33
8. Introducing **Anomalies/Outliers** (discussion on applications of anomaly detection, challenges in anomaly detection, types of anomalies and approaches for anomaly detection (statistical and distance based methods)	Usage	H	M	M	M	L	H	H	H	L	H	76.67
9. Introduction to **WEKA** tool for data mining tasks	Familiarity	H	L	M	H	L	H	H	L	M	M	70
Weightage		100	81.5	74.1	59.3	48.2	85.2	85.2	59.3	48.2	81.5	

Minutes of the meeting

Department of Computer Science & Engineering and Information Technology

Minutes of meeting of Program Evaluation Committee in Computer Science & Engineering and Information Technology department held on 10th August, 2015 at 11:00 A.M. in the Board Room, Jaypee University of Information Technology, Waknaghat. The following members were present:

1. Prof. S.P. Ghrera, HOD, CSE & IT Department (Chair Person)
2. Dr. Vivek Sehgal, Associate Professor
3. Dr. Yashwant Singh, Assistant Professor (Senior Grade)
4. Dr. Hemraj Saini, Assistant Professor (Senior Grade)
5. Dr. Pardeep Kumar, Assistant Professor (Senior Grade)
6. Dr. Rajni Mohana, Assistant Professor (Senior Grade)
7. Mr. Amit Kumar Singh, Assistant Professor

Resolutions:

The following resolutions were adopted

1. It was resolved to modify syllabus of following electives including Big Data Analytics, Mobile Computing, Web Application Engineering, Information retrieval and data mining and ARM based Embedded System Design to bring the physical, analytical and computational approaches of CSE to bear on the challenges they take on, abstracting essential structure, recognizing sources of uncertainty, and applying appropriate models, technical tools, and evaluations to develop their solutions.

2. It was resolved to adopt T-1, T-2 and T-3 scheme of evaluating theory courses to promote life-long self learning abilities to remain professionally effective to the society at large.

3. It was resolved to include multi disciplinary projects having supervisors from other departments like electronics and communication, bioinformatics etc to promote among student graduates the ability to gain multidisciplinary knowledge through projects and industrial training, leading to a sustainable competitive edge in R&D and meeting societal needs and to inculcate group work and team management skills with cross-cultural etiquettes, promoting knowledge transfer leading to conceptualization and delivery of projects with varied complexity.

4. It was resolved to accept the evaluation of PEOs.

Minutes of the meeting

2016 Department of Computer Science & Engineering and Information Technology Engineering.

Minutes of meeting of Board of Studies in Computer Science & Engineering Department, held on 10th June, 2016 at 11:00 A.M. in the Board Room, Jaypee University of Information Technology, Waknaghat. The following members were present:

1. Prof S P Ghrera, HOD CSE Dept (Chairperson)
2. Dr. Vivek Sehgal
3. Dr. Yashwant Singh
4. Dr. Hemraj Saini
5. Dr. Pardeep Kumar
6. Dr. Pradeep Kumar Singh
7. Dr. Rajni Mohana
8. Dr. Shailendra
9. Dr. Ravindara Bhatt
10. Dr. Amit Kumar Singh
11. Prof. Dr. Manu Sood, Director, UIIT, HP University
12. Nominees from the departments of Electronics & Communication Engineering, Civil Engineering, Bio Technology/Bio-Informatics, Mathematics and Physics.

RESOLUTIONS:

1. It was resolved to introduce a new post graduate program with specialization in Software Systems Security, i.e. M Tech CSE (SSS) from the academic year starting on July, 2016.

2. It was resolved to approve the curricula of M Tech CSE (SSS), as attached in the Appendix A.

3. It was resolved to introduce following three courses for M Tech CSE (SSS):

a. "Cryptography and Information System Security (16M21CI122)"

b. "Security of Database Systems (16M21CI121)"

c. "Cryptanalysis (16M21CI123)"

The course descriptions and CO-PO Mappings for the above courses are attached in the Appendix B, C and D, respectively.

4. The recommendations of PEC report and the action taken on the recommendations (10^{th} Aug, 2015) were approved in the meeting.

5. **Suggestion from the member(s):**

It was suggested by Prof. Manu Sood (External Member) that there should be only one course on algorithm, which should focus on "Advanced Algorithm" with a precursor of "Algorithm Basics". Moreover, the paper entitled "Information and Network Security" mentioned in the third semester of M Tech CSE (SSS) should be taught as a compulsory paper and not as an optional one.

The suggestions were considered by the BOS and will be incorporated in the next revision of the curricula.

HOD CSE/IT

MEMBERS OF BOARD OF STUDIES (2016)

10 June 2016

Department of Computer Science & Engineering and Information Technology

1. Chairperson: Prof S. P. Ghrera, HOD, CSE Dept.
2. Members :
   i. Dr. Vivek Sehgal
   ii. Dr. Yashwant Singh
   iii. Dr. Hemraj Saini
   iv. Dr. Pardeep Kumar
   v. Dr. Pradeep Kumar Singh
   vi. Dr. Rajni Mohana
   vii. Dr. Shailendra
   viii. Dr. Ravindara Bhatt
   ix. Dr. Amit Kumar Singh
   x. Dr. Pradeep Gupta
3. Nominees from the departments of ECE, BT/BI, CE, Maths, Physics and IT
   i. Prof Sunil Bhooshan, HOD, Deptt of ECE
   ii. Prof R S Chauhan, HOD, Deptt of BT/BI
   iii. Prof A K Gupta, HOD, Deptt of CE
   iv. Prof Harinder Singh, HOD, Deptt of Maths
   v. Prof P B Burman, HOD, Deptt of Physics

4. External Experts :

   i. Prof. Dr. Padam Kumar, Dean, R, I & D, JIIT, Noida

   ii. Prof. Dr. Manu Sood, Director, UIIT, HP University

   iii. Prof. Dr. Mayank Dave, NIT Kurukshetra

10/06/16

5. Representative from industry/corporate sector

   i. Sh Prantik Thakur, Service Delivery Manager, CSC, Indore

6. Postgraduate Meritorious Alumnus:

   i. Mr. Rajkumar Tekchandani, Asst Prof, Thapar University, Patiala.

HOD CSE/IT