

15M1WCI431: Advanced AI

Course Credit: 3

Semester: M.Tech, IV

Introduction

The course introduces the students with a number of modern meta-heuristic techniques taken from the area of natural computation for solving hard optimization problems. The student will be encouraged to solve real world optimization problems using the learnt techniques and to do a guided research on methodological issues of the techniques. Topics are likely to be drawn from the following list: planning, scheduling, games, search, reasoning (constraint-based, model-based, spatial, temporal), knowledge representation, decision-making under uncertainty, reinforcement learning, agents, and foundations.

Course Objectives (Post-conditions)

On completion of the course students will be expected to:

Knowledge objectives:

1. Gain both a wide and a deep knowledge of the Topics(s) taught in the current instance of the course.
2. Improve their skills at navigating through, and critically examining, the scientific literature on the taught Topics(s).

Application objectives:

The course will teach you to apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems. Through home assignments you will be able to analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

Expected Student Background (Preconditions)

Students are expected to have a sound understanding of artificial intelligence techniques and the fundamentals of computing before commencing this course. These include planning, knowledge representation, advanced search techniques, and heuristic approaches to problem solving.

Topics Outline:

S NO	Topics	Hrs
1	Logic and Artificial Intelligence	7
2	Automated planning and scheduling	6

3	Optimization Techniques in Artificial Intelligence	10
4	Uncertain Knowledge and Reasoning	11
5	Expert Systems and Artificial Intelligence	8
6	Swarm Intelligence and Natural level processing	6
		48

References

1. Z. Michalewicz and D.B. Fogel, *How to Solve It: Modern Heuristics* , Springer-Verlag, 2000.
2. E. Aarts and J.K. Lenstra, *Local Search in Combinatorial Optimization* , Priceton University Press, 2003.
3. D. Corne, M. Dorigo, F. Glover, *New Ideas in Optimisation* , McGraw-Hill, 1999.
4. J.J. Schneider and S. Kirpatric, *Stochastic Optimization* , Springer-Verlag, 2006.

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