CSE328/CSE3151: Artificial Intelligence

Programme: B. Tech. (CSE, CCE)	Year: 3	Semester: 5
Course: Program Core	Credits : 3	Hours : 40

Course Context and Overview (100 words):
This course discusses the origin and evolution of the field of Artificial Intelligence, failures, successful applications and philosophical foundations. This course will cover state of the art topics in AI as covered in various universities throughout the world. It will cover the basics of uninformed search, A* search and heuristics, constraint satisfaction problems, minimax, expectimax, probabilistic decision making using Hidden Markov Models, Bayes Net, Naïve Bayes. Introduction to Reinforcement learning.

Prerequisites Courses: Data Structures and Algorithms

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 : Identify problems that are amenable to solution by AI methods.
CO2 : Reason about the state-space search algorithm to use under different problem specific conditions.
CO3 : Understand the concepts behind knowledge representation and their integration with the statistical AI approaches
CO4 : Implement probabilistic solutions for decision making such as Hidden Markov Models, Bayes' Networks, etc.
CO5 : Design and code solutions to a wide variety of artificial intelligence problems where the machine can learn from the world and act accordingly.

Course Topics:

Topics	Lecture Hours	
UNIT – I Introduction	2	
1.1 Artificial Intelligence, History, Philosophical Foundations.	2	4
1.2 Basics of Searching: BFS, DFS		
UNIT – II Problem Solving by Searching		
2.1 Uniform Cost Search	2	
2.2 Heuristics, A* search	3	12
2.3 Constraint Satisfaction Problems	4	
2.4 Game Trees: Minimax, Expectimax, Utilities.	3	

UNIT – III Knowledge Representation		
3.1 Introduction, Knowledge Agents, Predicate logic, Inference rule, theorem proving	4	8
3.2 Forward chaining, backward chaining, propositional knowledge, rule based systems, forward reasoning, use of backtracking, structured KR	4	
UNIT – IV Probabilistic Reasoning		
4.1 Probability: Basics, Marginal, Conditional, Joint Distribution	1	6
4.2 Markov Models, Hidden Markov Models	5	
UNIT- V Baye's Net	8	
5.1 Bayes' rule, Bayes' Nets: Representation, Independence and Inference. Naïve Bayes		10
5.2 Reinforcement Learning	2	

Text Book:
1. Stuart Russell, Peter Norvig, *"Artificial Intelligence" – A Modern Approach*, 3rd Edition, Pearson Education, 2009.

Reference Books:
2. Nils J. Nilsson, *"The Quest for Artificial Intelligence"*, Cambridge University Press. 2009
3. P.H. Winston, *"Artificial Intelligence"*, 3rd Edition, Addison-Wesley Publishing Company, 1993
4. Elaine Rich and Kevin Knight, *"Artificial Intelligence"*, 3rd Edition, McGraw-Hill, 2017.
5. Deepak Khemani, *"A First Course in Artificial Intelligence"*, 1st Edition, McGraw-Hill Education, 2013

Additional Resources
1. UC Berkeley CS188 Intro to AI -- Course Materials (http://ai.berkeley.edu/home.html)

Evaluation Methods:

Component	Weightage (%)
Midterm	30
Quiz/Project/Seminar Presentation	20
Endterm	50

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