SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben Jivanlal College of Commerce & Economics (AUTONOMOUS)

Program: Bachelor of Science (Computer Science)		**Semester: V**	
Course: Artificial Intelligence		**Course Code: USMACS501**	
Teaching Scheme		**Evaluation Scheme**	
Lecture (Hours per week)	**Credit**	**Continuous Assessment (CA)**	**Semester End Examinations (SEE)**
04	4	25%	75%

Learning Objectives:

- Artificial Intelligence (AI) and accompanying tools and techniques bring transformational changes in the world. This course aims to introduce the learner to this interesting area.
- It also aims to train students to provide AI based solutions to real-world problems

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Explore fundamentals of AI and problem-solving algorithms
CO2: Implement AI models and reasoning based on probabilistic reasoning
CO3: Build decision making models based on statistical & reinforcement learning

Outline of Syllabus: (per session plan)

Module	**Description**	**No of hours**
1	Fundamentals of AI and Problem solving algorithms	15
2	Game Playing & Symbolic AI	15
3	Probabilistic Reasoning based AI	15
4	Statistical & Reinforcement learning	15
	Total	**60**

Module	Topic	No. of Hours/Credits 60/4
1	**Fundamentals of AI and Problem solving algorithms**	**15**
	What Is AI: Foundations, History and State of the Art of AI. Intelligent Agents: Agents and Environments, Nature of Environments, Structure of Agents. Problem Solving by searching: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions. Iterative Improvement Algorithms: Hill Climbing and simulated annealing, Genetic Algorithms	**6** **7** **2**
2	**Game Playing & Symbolic AI**	**15**
	Game Playing: Overview and Example Domain, Min-max Search, Adding Alpha-Beta Cutoffs. First Order Predicate Logic -Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information	**3** **12**
3	**Probabilistic Reasoning based AI**	**15**
	Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Belief Networks, Efficient Representation of Conditional Distribution, Exact inference in Bayesian network, Approximate inference in Bayesian network Probabilistic Reasoning over Time: Time and uncertainty, Inference in temporal models, Hidden Markov Models, Dynamic Bayesian Networks	**8** **7**
4	**Statistical & Reinforcement learning**	**15**
	Complex Decisions: Sequential Decisions Problem, Value Iteration, Policy Iteration Statistical Learning: Learning with Complete Data, Learning with Hidden variables Reinforcement learning: Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, Applications of Reinforcement Learning.	**3** **3** **9**

RECOMMENDED READING:
ESSENTIAL READING:

1. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig,3rd Edition, Pearson, 2010.

SUPPLEMENTARY READING:

1. Artificial Intelligence: Foundations of Computational Agents, David L Poole, Alan K. Mackworth, 2nd Edition, Cambridge University Press ,2017.
2. Artificial Intelligence, Kevin Knight and Elaine Rich, 3rd Edition, 2017
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, Springer, 2013