

Course Type	Course Code	Name of Course	L	T	P	Credit
OE	CSO303	Artificial Intelligence	3	0	0	9

#### Course Objective

Course will introduce the basic principles in artificial intelligence, which covers blind and heuristic search strategies, simple knowledge representation schemes, introduction to CSP problems and use for general purpose heuristic for constraint propagation, genetic algorithm, rule based system, Introduction to probabilistic reasoning, planning and learning neural network models, Areas of application, natural language processing, will be explored. The PROLOG programming language will also be introduced.

#### Learning Outcomes

Understanding of the following: Problem as Search - Converting real world problems into AI search problems and explain important search concepts, such as the difference between informed and uninformed search, the definitions of admissible and consistent heuristics and completeness and optimality. Understanding of various heuristic search techniques, MiniMax search for game playing. Constraint Satisfaction - Formulation of real world problem as CSP problem and solution for CSP using general purpose heuristics, Genetic Algorithm for optimization. Knowledge representation using First order logic, proofs in first order using techniques such as resolution, unification. Rule based system and logic programming using Prolog programming language, Planning techniques, Bayesian network and reasoning Fundamentals of learning using neural net, decision tree, naïve- Bayes, nearest neighbour, inductive learning, Fundamentals of NLP.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Artificial Intelligence Introduction, Brief history, Problem solving by search: state space, Search and Knowledge representation. Uninformed search :	5	Learning various Informed and Uninformed search techniques.
	Breadth First Search, Depth First Search, Depth First with Iterative Deepening and Uniform Cost Search,		
2	Heuristic Search: Hill climbing, Simulated Annealing, A*, problem reduction, Algorithm, Minimax search	6	Learning heuristic search
3	Binary and Higher order CSP, Constraint Satisfaction Graph, MRV, Degree, Least Constraining, Forward Checking and Arc Consistency General purpose heuristics for CSP	6	Learning various techniques constraint satisfaction problems.
4	Introduction to genetic algorithm, operations : selection, crossover, mutation examples	4	Learning various techniques in the context of AI.
5	Logic based representations (PL, FoL) and inference, Logic Programming: Prolog. Rule based representations, forward and backward chaining, matching algorithms.	5	Learning various logic representation techniques includes forward and backward chaining.
6	Planning Techniques: Goal Stack Planning, Constraint posting	4	Learning various planning techniques in the context of AI.
7	Probabilistic Reasoning: Bayesian Network and reasoning.	3	Learning various probabilistic techniques includes Bayesian network and reasoning.
8	Learning: Neural Network models, Statistical methods: Naive-Bayes, Nearest Neighbor, Decision trees, Inductive Learning	5	Learning various techniques in NN, Decision tree and learning methods.
9	Introduction to Natural Language Processing	2	Learning various techniques in NLP.

#### Text Books:

1. Artificial Intelligence Modern Approach Third Edition by S. Russell. Norvig, PHI

**Reference Books:**

1. Artificial Intelligence Third Edition by Kevin Knight (Author), Elaine Rich (Author),
2. Artificial Intelligence, Structures and Strategies for Complex Problem Solving George F Luger, Sixth Edition, Pearson
3. Machine Learning by Mitchell, Tom M. Indian Edition