

## INT404:ARTIFICIAL INTELLIGENCE

L:3 T:1 P:0 Credits:4

**Course Outcomes:** Through this course students should be able to

CO1 :: describe basic knowledge representation, problem solving, and learning methods of artificial intelligence.

CO2 :: compare various search techniques used to solve AI problems.

CO3 :: use analytical concepts for solving logical problems using heuristics approaches.

CO4 :: examine the various statistical reasoning techniques to solve AI problems.

CO5 :: justify the performance of different game playing algorithms.

CO6 :: discuss the concepts of machine learning, fuzzy logic, genetic algorithms and NLP.

### Unit I

**Introduction** : What is intelligence?, what is artificial intelligence?,, Foundations of artificial intelligence(AI), History of AI, Basics of AI, Artificial Intelligence Problems, Artificial Intelligence Techniques, applications of AI, branches of AI

**Problem Spaces and Search** : Defining the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in designing search problems, Breadth first search (BFS), Depth first search(DFS), Bi-directional Search, Iterative Deepening

### Unit II

**Informed Search Strategies** : Heuristic functions, Generate and Test, Hill Climbing, Simulated Annealing, Best first search, A\* algorithm, Constraint satisfaction

### Unit III

**Knowledge Representation** : Representations & mappings, Approaches in knowledge representation, Issues in knowledge representation, Propositional logic, Predicate logic, Procedural versus declarative knowledge, Logic programming, Forward versus backward reasoning

### Unit IV

**Statistical reasoning** : Probability & Bayes' theorem, Bayesian networks, Dempster-Shafer-Theory, Certainty factors & rule-based systems

**Weak slot and filler structures** : Semantic nets, Frames

**Strong slot and filler structures** : Conceptual dependency, Scripts

### Unit V

**Game playing** : Evaluation function, Minmax Problem, The min-max search procedure, Alpha-beta cutoffs, Alpha-beta pruning

**Natural Language Processing** : introduction to NLP, NLP phases, construction of parse tree, Spell checking, bag of words model, Soundex algorithm, Applications of NLP, Alexa, siri, cortana

### Unit VI

**Advanced topics in Artificial Intelligence** : Definition of Machine Learning, Types of Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Overview of Neural Networks, Overview of Genetic Algorithms, Overview of Fuzzy Logics

**Current trends in AI** : The augmented workforce, AI in cybersecurity, Explainable AI, AI and the metaverse, autonomous vehicles

### Text Books:

1. ARTIFICIAL INTELLIGENCE by RICH, KNIGHT, MCGRAW HILL EDUCATION

### References:

1. ARTIFICIAL INTELLIGENCE by KEVIN KNIGHT, ELAINE RICH, B. SHIVASHANKAR NAIR, MC GRAW HILL
2. ARTIFICIAL INTELLIGENCE AND INTELLIGENT SYSTEM by N. P. PADHY, OXFORD UNIVERSITY PRESS

