



TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

AN AUTONOMOUS INSTITUTION

Accredited by NBA and NAAC with 'A+' Grade.
(Sponsored by TKR Educational Society, Approved by AICTE, Affiliated to JNTU H)
Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097

Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrct.ac.in



CSE(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

L/T/P C
3/0/0 3

FUNDAMENTALS OF AI **(D66OE1)**

Course Objectives:

Learn the difference between optimal reasoning Vs human like reasoning understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Apply the knowledge of what is AI, risks and benefits of AI, limits of AI and the ethics involved in building an AI application. L3
2. Apply the nature of environments and the structure of agents. L3
3. Make use of the ability to select a search algorithm for a problem and characterize its time and space complexities. L4
4. Analyze the skill for representing knowledge using the appropriate technique. L4
5. Make use of the understanding of the applications of AI. L3

UNIT I

Foundations of AI: Introduction to AI, History of AI, Strong and Weak AI, the State of the Art, Risks and Benefits of AI

Philosophy, Ethics and Safety of AI: The Limits of AI, Machine thinking capability, The Ethics of AI **Intelligent Agents:** Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT II

Solving Problems by Searching: Problem – Solving Agents

Uninformed Search Strategies: Best-First Search, Breadth-First Search, Uniform-Cost Search, Depth-First Search, Iterative Deepening Search and Bidirectional Search

Informed Search Strategies: Greedy Best-First Search, A* Search

UNIT III

Logical Agents: Knowledge-based agents, Propositional Logic, Propositional Theorem Proving **First-Order Logic:** Syntax and Semantics of First-Order Logic

Inference in First-Order Logic: Propositional Vs. First-Order Inference, Unification and First-Order Inference, Forward Chaining, Backward Chaining
Knowledge Representation: Ontological Engineering, Categories and Objects, Events

UNIT IV

Quantifying Uncertainty: Basic Probability Notation, Inference Using Full-Joint Distributions, Independence, Bayes' Rule and its Use, Naive Bayes Models

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The semantics of Bayesian Networks, Exact Inference in Bayesian Networks

UNIT V

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Model Selection, Linear Regression and Classification, Ensemble Learning

Natural Language Processing: Language Models, Grammar, Parsing, Complications of Real Natural Language, Natural Language Tasks

Robotics: Robots, Robot Hardware, Kind of Problems solved, Application Domains

Computer Vision: Simple Image Features, Using Computer Vision

Text books:

1. "Artificial Intelligence a Modern Approach", Fourth Edition, Stuart J. Russell & Peter Norvig – Pearson.

Reference books:

1. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair — McGraw Hill Education.
2. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
3. Artificial Intelligence, 3rd Edn., Patrick Henry Winston, Pearson Education.
4. Artificial Intelligence, Shivani Goel, Pearson Education.
5. Artificial Intelligence and Expert systems – Patterson, Pearson Education



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MACHINE LEARNING BASICS **(D66OE2)**

Course Objectives:

Introduce the basic concepts and techniques of Machine Learning and have a thorough understanding of the Supervised and Unsupervised learning techniques.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Distinguish between, supervised, unsupervised and semi-supervised learning. L3
2. Apply algorithms for building classifiers applied on datasets of non-linearly separable classes. L3
3. Apply the principles of evolutionary computing algorithms. L3
4. Design an ensemble to increase the classification accuracy L4
5. Apply Reinforcement Learning algorithm for different real world application. L3

UNIT I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation

UNIT III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT IV

Support Vector Machines Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT V

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo
– Hidden Markov Models

Text books:

1. Stephen Marsland, —Machine Learning — An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

Reference books:

1. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
3. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
4. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.



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INTRODUCTION TO NATURAL LANGUAGE PROCESSING (D66OE3)

Course Objectives:

Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

Upon completion of this course the student will be able to:

1. Compare and Contrast sensitivity to linguistic phenomena and an ability to model them with formal grammars. L3
2. Make use of the proper experimental methodology for training and evaluating empirical NLP systems. L3
3. Apply manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods. L3
4. Design, implement, and analyze NLP algorithms; and design different language modeling Techniques. L4
5. Compare and contrast N-Gram Models, Language Model Evaluation, Bayesian parameter estimation. L3

UNIT I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

Text books:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication.

Reference books:

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, PearsonPublications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.



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CHATBOTS (D66OE4)

Course Objectives:

Knowledge on concepts of chatbots and understanding the developer environment bot framework.

Course Outcomes:

Upon completion of this course the student will be able to:

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|---|----|
| 1. Apply basic concepts of chatbots. | L3 |
| 2. Analyze different entities in building bots. | L4 |
| 3. Make use of the concepts of advanced bot building. | L3 |
| 4. Discuss different types of chatbot use cases | L3 |
| 5. Compare and Contrast Business and Monetization Analytics, Chatbot Use Cases- Modes of Communication. | L3 |

UNIT I

Introduction to Chatbots: Definition of chatbots, Journey of Chatbots, Rise of Chatbots, Messaging Platforms

UNIT II

Setting Up the Developer Environment Botframework

Local Installation, Installing NodeJS, Following the Development Pipeline, Storing Messages in Database.

UNIT III

Basics of Bot Building- Intents, Entities

UNIT IV

Advanced Bot Building

Design Principles, Showing Product Results, Saving Messages, Building Your Own Intent

Classifier

UNIT V

Business and Monetization

Analytics, Chatbot Use Cases- Modes of Communication- Business-to-Business (B2B), Business-to-Consumer (B2C) Consumer-to-Consumer (C2C) Business-to-Employee (B2E), Employee-to-Employee (E2E), Chatbots by Industry Vertical

Text books:

1. Rashid Khan, Anik Das, Build Better Chatbots: A Complete Guide to Getting Started with Chatbots, Apress

Reference books:

1. Drexen Braxley, Chat GPT #1 Bible - 10 Books in 1: A Comprehensive Guide to AI: Elevate Your Daily Life, Increase Work Output, Secure Financial Gains, Foster Career Growth, and Cultivate Modern Talents Paperback
2. D. Nardo Publications, ChatGPT Made Simple How Anyone Can Harness AI To Streamline Their Work, Study & Everyday Tasks To Boost Productivity & Maintain Competitive Edge By Mastering Prompt Engineering
3. Robert E. Miller, Prompt Engineering Bible Join and Master the AI Revolutions Profit Online with GPT- & Plugins for Effortless Money Making!
4. Lucas Foster, Chat GPT Bible Developer and Coder Special Edition: Enhancing Coding Productivity with AI-Assisted Conversations.