

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)
SEMESTER	5
COURSE TITLE	ARTIFICIAL INTELLIGENCE
COURSE CODE	01CE0525
COURSE CREDITS	4

Objective:

- 1 As the World Wide Web continues to expand, AI and its methodologies are being applied in various areas that have a direct impact on human life. Various techniques for encoding information in computer systems, such as Predicate Logic, Production Rules, and Semantic Networks, are being utilized to solve real-world problems. In addition, fields like Game Playing, Natural Language Processing, and Connectionist Models are also essential. Graduates are expected to have a good understanding of the fundamentals of AI and its processes, in addition to having proficiency in at least one programming language.

Course Outcomes: After completion of this course, student will be able to:

- 1 Use and analyze state space search algorithm to solve problems in artificial intelligence.
- 2 Analyze Industrial AI concepts and apply suitable algorithms for real-world industrial applications.
- 3 Apply knowledge representation and NLP techniques for logical reasoning and text processing.
- 4 Develop game-playing agents and plan solutions to problems using planning systems.
- 5 Apply the tools and techniques of AI and develop real-world applications.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to AI & Production System Fundamental concepts The History of Artificial Intelligence,, The AI Problems, AI Techniques, Intelligent Agents, Applications of AI, Problem formulation, Problem Definition – Production System, Control Strategies, Problem Characteristics, Uninformed Search - DFS, BFS,, Uniform Cost Search, Heuristic Search - Generate-And-Test,, Hill Climbing, Best First Search, A*,, Problem Reduction - AO*,, Constraint Satisfaction, Means-Ends Analysis.	6

Contents : Unit	Topics	Contact Hours
2	Industrial AI Difference between Industrial AI and AI, why do we need Industrial AI – New Perspective in industrial system for AI,, AI, Basic Problem in industry, Basic method of problem solving with AI, Machine Intelligence meets Industry, Industrial AI – Categories of Algorithm, Industrial AI Algorithm: Selection and Application., Application Scenario Types of Industrial AI, Enabling Industrial AI system, Intelligent operation, Intelligent rail transit predictive maintenance system.	8
3	Knowledge Representation and Logic & NLP Knowledge Representations and Mappings, Issues in Knowledge Representation, Representing Knowledge using Rules: Procedural Versus Declarative Knowledge, Forward Versus Backward Reasoning, ISA Relationship, Resolution., Introduction, Steps in NLP (Morphological Analysis, Syntactic Processing, Semantic Analysis Discourse and Pragmatic Processing), Applications of NLP - Spell Checking, Text Analytics: Text pre- processing, Machine Translation, sentiment analysis	12
4	Game Playing and Planning Game Playing: The MiniMax Search Procedure., Adding AlphaBeta Cutoffs, Additional Refinements, Iterative, Deepening, Planning: Blocks World Problem, Components of Planning System, Goal stack Planning, STRIPS	6
5	AI Application & Mini Project Basics of Python: Variables, loops, functions., Introduction to libraries: Numpy, Panda, Data collection & preprocessing., Real world AI applications: Chatbot, Recommendation system, Image Classification, Introduction to industry tools: Scikit-learn/ TensorFlow/ PyTorch/ Google Colab, Machine Learning Models for Industrial Applications, AI & Digital Platforms case study.	10
Total Hours		42

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Practical 1 Introduction to Python & Environment Setup	2
2	Practical 2 Variables, Data Types, Operators, Loop & Iterations in Python	2
3	Practical 3 Introduction to NumPy	2
4	Practical 4 Introduction to Pandas	2
5	Practical 5 Data Collection and Preprocessing	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
6	Practical 6 Data Visualization Basics	2
7	Practical 7 Introduction to Machine Learning using Scikit-learn	2
8	Practical 8 Classification Model	2
9	Practical 9 Create basic Chatbot Development – Lab 1	2
10	Practical 10 Create basic Chatbot Development – Lab 2	2
11	Practical 11 Built a simple Recommendation System – Lab 1	2
12	Practical 12 Built a simple Recommendation System – Lab 2	2
13	Practical 13 Image Classification – Lab 1	2
14	Practical 14 Image Classification – Lab 2	2
Total Hours		28

Textbook :

- 1 "Artificial Intelligence: A Modern Approach", Stuart Russell and Peter Norvig,, Pearson,, 2016

References:

- 1 “Artificial Intelligence”, “Artificial Intelligence”, “Artificial Intelligence”, “Artificial Intelligence”, Elaine Rich and Kevin Knigh, , Tata Mcgraw-Hill,, 00
- 2 “Artificial Intelligence and Expert System”, “Artificial Intelligence and Expert System”,,, “Artificial Intelligence and Expert System”, “Artificial Intelligence and Expert System”,, D.W. Patterson, Prentice-Hall Of India Pvt. Limited,, 1990
- 3 “Introduction to Prolog Programming”, “Introduction to Prolog Programming”, “Introduction to Prolog Programming”, “Introduction to Prolog Programming”, Carl Townsend,, BPB Publications,, 1988
- 4 “PROLOG Programming For Artificial Intelligence”, “PROLOG Programming For Artificial Intelligence”, “PROLOG Programming For Artificial Intelligence”, “PROLOG Programming For Artificial Intelligence”, Ivan Bratko, Wesley, 1986
- 5 “Programming with PROLOG”, “Programming with PROLOG”, “Programming with PROLOG”, “Programming with PROLOG”, “Programming with PROLOG”, Klocks in and Mellish, Springer Berlin Heidelberg, 2003

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	40.00	30.00	30.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- 1 <https://www.edx.org/course/cs50s-introduction-to-artificial-intelligence?with-python>
- 2 <https://www.coursera.org/learn/ai-for-everyone>
- 3 <https://www.journals.elsevier.com/artificial-intelligence>
- 4 <https://www.springer.com/journal/10994>
- 5 <https://dl.acm.org/journal/tist>