



CVM
UNIVERSITY

(Established under Gujarat Private Universities
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FACULTY OF ENGINEERING & TECHNOLOGY

Second/Third Year Bachelor of Engineering/Technology

Course Code: 102044503

Course Title: Artificial Intelligence

Type of Course: Professional Core Course/Professional Elective Course

Course Objectives: The concepts of artificial intelligence have been in focus since the inception of modern computers. The advancements in computing technologies have further stressed on the use of AI concepts in many real world problems. This course will aim to provide fundamental knowledge in basic domains of AI like search, knowledge representation and inference, game playing, planning, Natural Language processing and genetic algorithms. The course will also focus on study and use of logic programming for solving AI problems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	40 / 14	20 / 07	60/ 21	30/10	150 / 52

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction, Problems and Search: Introduction to Artificial Intelligence, Applications of AI Problems, Problem Spaces and Search: Problem as state space search, Production systems, Problem Characteristics	4
2	Heuristic Search Techniques: What is heuristics? Hill Climbing, Best First Search and A*, Problem Reduction and AO*, Constraint Satisfaction, Means-Ends Analysis	7
3	Game Playing and Planning: Game Playing: Overview, Minimax Search, Pruning through Alpha-beta cut-offs, Iterative deepening Planning: The Blocks World, Components of a Planning System, Goal Stack Planning	6
4	Knowledge representation and Inference: Propositional logic, Using Predicate Logic: Representing facts, Inference methods - Resolution, Forward Reasoning, Backward Reasoning	11



	Reasoning under uncertainty: Probability and Bayes' Theorem, Bayesian Networks, Introduction to Fuzzy Logic	
5	Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking	4
6	Genetic Algorithms: Introduction to Genetic Algorithms (GAs), Genetic Operators, Termination Parameters, Applications.	4
7	Logic Programming: Programming languages in AI: Prolog, LISP, Python Prolog: Knowledge representation through facts and rules, Variables, Control structures and Operators, Matching, Backtracking, Recursion, List, Working with demo problems	4

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
15%	25%	25%	15%	15%	5%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence", 3 rd Edition, McGraw Hill
2	Stuart J Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson
3	Vinod Chandra S.S. and Anand Harindran S., "Artificial Intelligence and Machine learning", PHI
4	Denis Rothman, "Artificial Intelligence", Example. By, Packt
5	Ivan Bratko, PROLOG Programming For Artificial Intelligence", Pearson Education
6	Nils J Nilsson, "Artificial Intelligence: A new synthesis", The Morgan Kaufmann Series in Artificial Intelligence

Course Outcomes (CO):

Sr.	Course Outcome Statements	% Weightage
CO-1	Understand and apply the search techniques for solving real world problems	30
CO-2	Learn and use various knowledge representation and reasoning methods.	25
CO-3	Study and use of AI in game playing, planning and NLP.	20
CO-4	Apply of genetic algorithms in search and optimization tasks	10



CO-5	Develop solution of AI problems with by using logic programming.	15
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List of Practicals / Tutorials:

1	Working with Prolog.
2	Study of recursion in Prolog. Solving Tower of Hanoi Problem using Prolog or Python.
3	Implement 'Monkey-banana Problem' using Prolog.
4	Study of List in Prolog. Implement programs of finding member of list, length of list, insert element, delete element, union, etc.
5	Implementation of Best first search or A* for solving AI problem (8-puzzle or Water Jug or other)
6	Implement a program to solve N-Queens problem using Prolog.
7	Solving Travelling Salesman Problem using Prolog or Python.
8	Solving Cryptarithmic problem using Prolog or Python.
9	Implement Tic-Tac-Toe game using Min Max algorithm.
10	Use of Genetic algorithm for a given search and optimization problem. (De Jong's function, Rastrigin function, etc.)
11	Implement text tokenization using python.
12	Case Study: Study of any AI system or real-time application.

Supplementary Learning Material:

- 1 NPTEL - Swayam Courses: <https://nptel.ac.in/courses/106105077>
https://onlinecourses.nptel.ac.in/noc22_cs56/preview
- 2 Coursera courses: AI For Everyone, IBM Applied AI, AI Foundations for Everyone, Introduction to Artificial Intelligence (AI)

Curriculum Revision:

Version:	1
Drafted on (Month-Year):	Apr-21
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	