GYANMANJARI INNOVATIVE UNIVERSITY   GYANMANJARI COLLEGE OF COMPUTER SCIENCE

Gyanmanjari
Innovative University

Subject: Artificial Intelligence –MSCIT12509
Type of course: Major Core
Prerequisite: Probability, Statistics, Algebra, Matrix, Calculus

Rationale:

Artificial Intelligence (AI) has become increasingly important in recent years due to its potential to transform many aspects of society, from healthcare and education to transportation and manufacturing. The following are some of the key reasons why AI is gaining momentum.

Efficiency and Productivity: AI can automate routine and repetitive tasks, freeing up human resources to focus on more complex and creative tasks. This can increase efficiency and productivity, allowing businesses to operate more effectively.

Improved Decision-making: AI can analyze vast amounts of data and provide insights that can inform decision-making. This can help businesses and organizations to make more informed and accurate decisions, leading to better outcomes.

Personalization and Customization: AI can analyze customer data to develop personalized recommendations and experiences, enhancing customer satisfaction and loyalty.

Cost Savings: AI can reduce costs by automating tasks and reducing the need for human labor. It can also optimize processes, reducing waste and improving efficiency.

Innovation and Progress: AI has the potential to drive innovation and progress by enabling new discoveries and developments in fields such as healthcare, finance, and transportation.

Overall, AI has the potential to revolutionize many industries and improve the lives of individuals around the world. However, it is important to consider the ethical and societal implications of AI as it continues to evolve and shape the future of our world.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				SEE		CCE			
CI	T	P	C	Theory	Practical	MSE	LWA	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

Course Content:

Sr. No	Course content	Hrs	% Weight age
1	**Introduction to Artificial Intelligence** : The AI Problems, The Underlying Assumption, techniques, The Level of The Model ,Criteria For Success, Basic of Python Programming.	05	15%
2	**Problems, State Space Search & Heuristic Search Techniques** : Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing Best-First Search, Problem Reduction Constraint Satisfaction, Means-Ends Analysis.	07	15%
3	**Knowledge Representation** : Introduction to Knowledge Representation, Logic-based Knowledge Representation, Applications of Knowledge Representation, Representations And Mappings, Approaches To Knowledge Representation, Representation Simple Facts In Logic, Representing Instance And Is-a Relationships, Computable Functions and Predicates, Resolution, Procedural versus, Declarative Knowledge, Logic Programming Forward versus Backward Reasoning.	07	15%
4	**Symbolic Reasoning Under Uncertainty** : Introduction To Non-monotonic Reasoning, Logics For Non-monotonic Reasoning.	03	5%

5	**Probabilistic Reasoning :** Probability And Bays' Theorem, Certainty Factors And Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic	03	5%
6	**Game Playing :** Overview, Mini Max Search Procedure, Alpha-Beta Cutoffs, Refinements, Iterative deepening.	04	5%
7	**Planning :** The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems.	04	5%
8	**Natural Language Processing :** Introduction, Syntactic Processing Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking	04	5%
9	**Expert Systems:** Representing and Using Domain Knowledge, Expert System Shells, Explanation Knowledge Acquisition.	05	5%

Continuous Assessment:(For each activity maximum-minimum range is 5 to 10 marks)

Sr. No	Active Learning Activities	Marks
1	**Case Studies:** Analyze and discuss real-world case studies where AI has been applied successfully. Examine the problem, the AI techniques used, the results, and the impact on various industries. upload it on Portal	10
2	**Idea Revolve:** Students have to identify potential domains or contexts where AI is not currently applied but could offer valuable solutions or improvements. Students have to prepare document file and upload it on GMIU web portal.	10
3	**MCQ Test :** A MCQ test will be taken on the platform.	10
4	**Presentation:** Faculty will assign topics and students have to prepare presentation on it and upload it on Portal	10
5	**Assignment:** Assignment of 10 questions will be given; Students have to upload the solved assignment on the portal.	10
	Total	50

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)

Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weight age	25%	45%	15%	15%	0	0

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.

Course Outcome:

	After learning the course the students should be able to:
CO1	Develop a strong grasp of the fundamental concepts, history, and assumptions underlying artificial intelligence, enabling the application of AI techniques across various domains.
CO2	Acquire problem-solving skills by formulating AI problems as state space search and applying heuristic search techniques, leading to efficient and effective solutions.
CO3	Learn how to represent and reason with knowledge using logic-based approaches, enabling the effective organization and utilization of information in AI systems.
CO4	Gain proficiency in handling uncertainty through probabilistic reasoning, non-monotonic reasoning, and alternative uncertainty reasoning techniques, enhancing decision-making in AI systems.
CO5	Explore practical domains such as game playing, planning, natural language processing, and expert systems, acquiring the ability to design and implement AI solutions and communicate their results effectively.

List of Practical

Sr. No	Descriptions	Unit No	Hrs
1	To study the installation of Python and understand the basic execution of a simple Python program.	1	2
2	To study different data types, variables and basic input–output operations in Python programming.	1	2
3	To understand the use of control statements, loops and user-defined functions in Python.	1	2
4	To study reading a dataset using Python and perform basic data cleaning by handling missing values.	2	2
5	To understand data normalization techniques using Python for preprocessing numerical data.	2	2
6	To implement a simple search technique using linear search for problem solving in artificial intelligence.	2	2
7	To study the concept of rule-based systems by implementing simple decision making using if–else statements.	3	2

8	To understand knowledge representation by storing and retrieving facts using Python data structures.	3	2
9	To implement a simple heuristic based decision-making approach using Python.	2	2
10	To understand the basic concept of game playing in artificial intelligence using a simple number guessing game.	6	2
11	To study the concept of planning by executing tasks in a step-by-step manner using Python.	7	2
12	To understand basic probabilistic reasoning by implementing simple probability calculations.	5	2
13	To study the basic concept of fuzzy logic by implementing a simple fuzzy decision system.	5	2
14	To understand the basics of natural language processing using simple text processing techniques in Python.	8	2
15	To study the concept of expert systems by implementing a basic rule-based expert system in Python.	9	2

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. Theteacher in addition to conventional teaching method by black board, may also use any of tools such asdemonstration, role play, Quiz, brainstorming, MOOCs etc.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, E-courses, Virtual Laboratory.

The internal evaluation will be done on the basis of Active Learning Assignment.Practical/Viva examination will be conducted at the end of semester for evaluation of performance ofstudents in laboratory.

Reference Books:

[1] Artificial Intelligence by Elaine Rich And Kevin Knight, (2nd Edition) Tata McGraw-Hill

[2] Artificial Intelligence: A Modern Approach By Stuart Russel, Peter Norvig, PHI

[3] Python for software design - How to think like a computer scientist By Allen B. Downey, Allen B. Downey.Cambridge University press, 2009.

[4] JPROLOG Programming For Artificial intelligence By ivan Bratko, Addison-Wesley.