

PROGRAM STRUCTURE FOR THIRD YEAR AI and DS
Scheme for Autonomous Program (With Effect from 2023-20234)
Semester V

Semester V								
Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.		Theory	Pract.	Total	
ADC501	Cloud Computing	3	--		3	--	3	
ADC502	Web Development	3	--		3		3	
ADC503	Artificial Intelligence	3	--		3	--	3	
ADC504	Data Warehousing & Mining	3	--		3	--	3	
ADLO5 01X	Department Level Optional Course- 1	3	--		3	--	3	
ADL501	Web Development L a b	--	2		--	1	1	
ADL502	Artificial Intelligence Lab	--	2		--	1	1	
ADL503	Data warehousing and Mining Lab		2		--	1	1	
ADL504	Business Communication and Ethics-II	--	2*+2		--	2	2	
ADS501	Skill based Lab : Cloud Computing	--	4 ^s		--	2	2	
Total		15	14		15	07	22	
Course Code	Course Name	Examination Scheme						
		Theory				Term Work	Pract	Total
		Internal Assessment		End Sem Exam	Exam. Duration (in Hrs)			
		Mid Term	CA					
ADC501	Cloud Computing	20	20	60	2	-	--	100
ADC502	Web Development	20	20	60	2	--	--	100
ADC503	Artificial Intelligence	20	20	60	2	--	--	100
ADC504	Data Warehousing & Mining	20	20	60	2	--	--	100
ADLO5 01X	Department Level Optional Course- 1	20	20	60	2	--	--	100
ADL 502	Web Development Lab					25	25	50
ADL502	Artificial Intelligence Lab	--	--	--	--	25	25	50
ADL503	Data Warehousing and Mining Lab	--	--	--	--	25	25	50
ADL504	Business Communication and Ethics-II	--	--	--	--	50	--	50
ADS501	Skill based Lab : Cloud Computing Lab					50	--	50
Total		100	100	300	--	175	75	750

Course Code	Course Name	Credit
ADC503	Artificial Intelligence	03

Pre-requisite: C Programming

Course Objectives: The course aims:

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|---|--|
| 1 | To gain perspective of AI and its foundations. |
| 2 | To study different agent architectures and properties of the environment |
| 3 | To understand the basic principles of AI towards problem solving, inference, perception, knowledge representation, and learning. |
| 4 | To investigate probabilistic reasoning under uncertain and incomplete information. |
| 5 | To explore the current scope, potential, limitations, and implications of intelligent systems |

Course Outcomes:

After successful completion of the course students will be able to:

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|---|---|
| 1 | Identify the characteristics of the environment and differentiate between various agent architectures. |
| 2 | Apply the most suitable search strategy to design problem solving agents. |
| 3 | Represent a natural language description of statements in logic and apply the inference rules to design Knowledge Based agents. |
| 4 | Apply a probabilistic model for reasoning under uncertainty. |
| 5 | Comprehend various learning techniques. |
| 6 | Describe the various building blocks of an expert system for a given real word problem. |

Module		Detailed Content	Hours
1		Introduction to Artificial Intelligence	3
	1.1	Artificial Intelligence (AI), AI Perspectives: Acting and Thinking humanly, Acting and Thinking rationally	
	1.2	History of AI, Applications of AI, The present state of AI, Ethics in AI	
2		Intelligent Agents	4
	2.1	Introduction of agents, Structure of Intelligent Agent, Characteristics of Intelligent Agents	
	2.2	Types of Agents: Simple Reflex, Model Based, Goal Based, Utility Based Agents.	
	2.2	Environment Types: Deterministic, Stochastic, Static, Dynamic, Observable, Semi-observable, Single Agent, Multi Agent	
3		Solving Problems by Searching	12
	3.1	Definition, State space representation, Problem as a state space search, Problem formulation, Well-defined problems	
	3.2	Solving Problems by Searching, Performance evaluation of search strategies, Time Complexity, Space Complexity, Completeness, Optimality	

	3.3	Uninformed Search: Depth First Search, Breadth First Search, Depth Limited Search, Iterative Deepening Search, Uniform Cost Search, Bidirectional Search	
	3.4	Informed Search: Heuristic Function, Admissible Heuristic, Informed Search Technique, Greedy Best First Search, A* Search, Local Search: Hill Climbing Search, Simulated Annealing Search, Optimization: Genetic Algorithm	
	3.5	Game Playing, Adversarial Search Techniques, Mini-max Search, Alpha-Beta Pruning	
4		Knowledge and Reasoning	10
	4.1	Definition and importance of Knowledge, Issues in Knowledge Representation, Knowledge Representation Systems, Properties of Knowledge Representation Systems	
	4.2	Propositional Logic (PL): Syntax, Semantics, Formal logic-connectives, truth tables, tautology, validity, well-formed-formula, Introduction to logic programming (PROLOG)	
	4.3	Predicate Logic: FOPL, Syntax, Semantics, Quantification, Inference rules in FOPL,	
	4.4	Forward Chaining, Backward Chaining and Resolution in FOPL	
5		Reasoning Under Uncertainty	5
		Handling Uncertain Knowledge, Random Variables, Prior and Posterior Probability, Inference using Full Joint Distribution	
		Bayes' Rule and its use, Bayesian Belief Networks, Reasoning in Belief Networks	
6		Planning and Learning	5
	6.1	The planning problem, Partial order planning, total order planning.	
	6.2	Learning in AI, Learning Agent, Concepts of Supervised, Unsupervised, Semi-Supervised Learning, Reinforcement Learning, Ensemble Learning.	
	6.3	Expert Systems, Components of Expert System: Knowledge base, Inference engine, user interface, working memory, Development of Expert Systems	
		Total	39

Textbooks:	
1	Stuart J. Russell and Peter Norvig, "Artificial Intelligence A Modern Approach —Second Edition" Pearson Education.
2	Elaine Rich and Kevin Knight —Artificial Intelligence Third Edition, Tata McGraw-Hill Education Pvt. Ltd., 2008.
3	George F Luger –Artificial Intelligence Low Price Edition, Pearson Education., Fourth edition.
References:	
1	Ivan Bratko —PROLOG Programming for Artificial Intelligence, Pearson Education, Third Edition.
2	D. W. Patterson, Artificial Intelligence and Expert Systems, Prentice Hall.
3	Saroj Kaushik –Artificial Intelligence, Cengage Learning.
4	Davis E. Goldberg, –Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, N.Y., 1989.
5	Patrick Henry Winston, –Artificial Intelligence, Addison-Wesley, Third Edition.
6	N. P. Padhy, –Artificial Intelligence and Intelligent Systems, Oxford University Press.

Internal Assessment:

Assessment consists of one Mid Term Test of 20 marks and Continuous Assessment of 20 marks. Mid Term test is to be conducted when approx. 50% syllabus is completed Duration of the midterm test shall be one hour.

Continuous Assessment:-

Continuous Assessment is of **20 marks**. The rubrics for assessment will be considered on approval by the subject teachers. The rubrics can be any 2 or max 4 of the following:-

Sr.no	Rubrics	Marks
7.	*Certificate course for 4 weeks or more:- NPTEL/ Coursera/ Udemy/any MOOC	10 marks
8.	Content beyond syllabus presentation	10 marks
9.	Creating Proof of concept	10 marks
10.	Mini Project / Extra Experiments/ Virtual Lab / Competitive programming-based event / Group Discussion	10 marks
11.	Multiple Choice Questions (Quiz)	5 marks
12.	GATE Based Assignment test/Tutorials etc	10 marks

*For sr.no.1, the date of certification exam should be within the term and in case a student is unable to complete the certification , the grading has to be done accordingly.

End Semester Theory Examination:

1	Question paper will be of 60 marks
2	Question paper will have a total of five questions
3	All questions have equal weightage and carry 20 marks each
4	Any three questions out of five needs to be solved.

Useful Links

1	An Introduction to Artificial Intelligence - Course (nptel.ac.in)
2	NPTEL
3	https://www.classcentral.com/course/independent-elements-of-ai-12469
4	https://tinyurl.com/ai-for-everyone