UPES

Year: 1st
Semester: 2nd

1. Name of the Faculty: Dr. Kiran Kumar Ravulakollu
2. Course : Introduction to Artificial Intelligence
3. Program : B. Tech CSE (AIM)
4. Target : Level - 2

Course Code: CSAI1004
L: 3
T: 0
P: 0
C: 3

COURSE PLAN

Target	50% (marks)
Level-1	40% (population)
Level-2	50% (population)
Level-3	60% (population)

1. Method of Evaluation

UG
Assignments & Activities (30%)
Mid Examination (20%)
End examination (50%)

2. Passing Criteria

Scale	UG
10 Point	SGPA – "5.0" in each semester CGPA – "5.0" Min. Individual Course Grade – "C" Course Grade Point – "4.0"

*for UG, passing marks are 35/100 in a paper

3. Pedagogy

- Student & Conceptual Centric Learning
  - Interactive Discussion
  - Activities
  - Videos

4. References:

Text Books	Web resources	Journals	Reference books
T1: Introduction to Artificial Intelligence (IBM ICE Publication). T2: Rich E & Knight K, Artificial Intelligence, Tata McGraw Hill, Edition 3.	V1. Youtube Link V2. NPTEL Link		R1: Russell S & Norvig P, Artificial Intelligence: A Modern Approach, Prentice Hall R2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education Asia (2009).

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GUIDELINES TO STUDY THE SUBJECT

Instructions to Students:

1. Go through the 'Syllabus' in the Black Board section of the web-site (https://learn.upes.ac.in) in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section. These are our lecture notes. Make sure you use them during this course.
4. Check your blackboard regularly
5. Go through study material
6. Check mails and announcements on blackboard
7. Keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. Cell Phones and other Electronic Communication Devices: Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. E-Mail and online learning tool: Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. Attendance: Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail to your concerned faculty. Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

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RELATED OUTCOMES

1. The expected outcomes of the Program are:

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer & Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment & Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual & Team-Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at-large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management & Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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PO12	**Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2. The expected outcomes of the Specific Program are:

PSO1	Perform system and application programming using computer system concepts, concepts of Data Structures, algorithm development, problem solving and optimizing techniques,
PSO2	Apply software development and project management methodologies using concepts of front-end and back-end development and emerging technologies and platforms
PSO3	To create & develop most efficient solutions by applying machine learning with analytical emphasis on industrial and research problems.

3. The expected outcomes of the Course are:

CO 1	Understand the Fundamentals of Artificial Intelligence
CO 2	Analyze the logical, reasoning, problem solving and learning technique.
CO 3	Comprehend concept of machine learning, neural network and Evolutionary Intelligence
CO 4	Analyze the real life problem and write an algorithm to solve a problem in moderate complexity.

4. Co-Relationship Matrix

Indicate the relationships by1- Slight (low) 2- Moderate (Medium) 3-Substantial (high)

PO/CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	1									2	2
CO2	2	2	1	1	1									2	2
CO3	2	2	2	1	1									2	2
CO4	2	2	2	3	1									2	2

5. Course outcomes assessment plan:

components / Course Outcomes	Assignment	Test/Quiz	Mid Semester	End Semester	Any other
CO 1	☐	☐	☐	☐	☐
CO 2	☐	☐	☐	☐	☐
CO 3	☐	☐	☐	☐	☐
CO 4	☐	☐	☐	☐	☐

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BROAD PLAN OF COURSE COVERAGE

Course Activities:

S. No.	Units Description	Planned			Remarks
		From	To	No. of Sessions	
1.	**Introduction to Artificial Intelligence**			4	
2.	**Logical Approach to AI & Knowledge bases systems**			6	
3.	**Probabilistic Approach to AI**			6	
4.	**Evolutionary Intelligence**			4	
5.	**Neural Networks, Natural Language Understanding**			6	
6.	**Introduction to Machine Learning**			6	
7.	**Learning Deterministic Models**			4	

SESSION PLAN

Class	TOPICS	Course Outcome
	Unit 1: Introduction to Artificial Intelligence	
1	History of Artificial Intelligence	CO1
2	What is AI? Emergence of AI	CO1
3	Cognitive Science & AI	CO1
	Unit 2: Logical Approach to AI & Knowledge bases systems	
4	Basics of Propositional Logic: Syntax, Semantics, Tautologies and Logical Implication,	CO1
5	Logical, Arguments, Derivation Systems,	CO1
6	Resolution in normal forms, derivations using resolutions & resolution algorithm, Artificial Intelligence	CO1
7	Applications: Knowledge-Based Systems, Wumpus World, Taxonomy	CO4
8	Knowledge: Semantic Nets, Model of Human Organization of Knowledge, Frame data structure, planning using frames,	CO2
9	Non-monotonic Logic: Circumscription, Default Logic, Difficulties	CO2
	Unit 3: Probabilistic Approach to AI	
10	Probability Basics: Probability Spaces, Conditional Probability and Independence, Bayes' Theorem	CO1
11	Meaning of probability, Relative frequency and subjective approaches, Random Variables	CO2
12	Probability Distributions of Random Variables, Independence of Random Variables, Random variables in applications,	CO2
13	Bayesian Networks -Definition, properties and representation	CO2
14	Inference, Algorithms and packages, Inference using Netica; Casuality and Markov condition in networks, Networks with Continuous Variables:	CO2
15	Gaussian Bayesian Networks, Hybrid Networks, Obtaining the Probabilities in a Bayesian Network:	CO2
16	Difficulty Inherent in Multiple Parents, Basic & Leaky Noisy OR-Gate Model	CO2

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17	Large-Scale Application of Bayesian Networks: Promedas	CO4
	Unit 4:Evolutionary Intelligence	
18	Genetics Review, Genetic Algorithms: Algorithm Description,	**CO3**
19	Illustrative Examples, Travelling Salesperson Problem; Ant system, Ant colonies	**CO3**
20	Artificial Ants in TSP, Flocks, application in Financial trading	**CO3**
	Unit 5: Neural Networks, Natural Language Understanding	
21	Understanding of Neural Networks, Functional structure of NN	**CO1**
22	Understanding of Natural Language Understanding, Parsing	**CO3**
23	Semantic Interpretation, Concept/Knowledge Interpretation	**CO3**
	Unit 6: Introduction to Machine Learning	
24	Origins of Machine Learning, Uses & Abuses of Machine Learning	**CO3**
25	How do Machines Learn? – Abstraction, Knowledge Representation, Generalization	**CO3**
26	Assessing Success of Learning 4 Steps to Apply Machine Learning to Data	**CO3**
27	Choosing ML Algorithm - Thinking about Input Data	**CO3**
28	Types of ML Algorithms, Matching Data to Appropriate Algorithm	**CO4**
	Unit 7: Learning Deterministic Models	
29	Supervised Learning : Concepts and Examples	**CO1**
30	Regression: Simple Linear, Multiple Linear Regression	**CO1**
31	Overfitting and Cross Validation, Parameter Estimation	**CO3**
32	Estimating Parameters for Simple Linear Regression, Gradient Descent, Logistic Regression and Gradient Descent,	**CO4**
33	Decision Tree: Information Theory, Information Gain and ID3 Algorithm	**CO4**
34	Unsupervised Learning: Clustering, Automated Discovery	**CO4**
35	Reinforcement Learning: Multi-Armed Bandit Algorithms, Dynamic Networks, Decision Trees, Influence diagrams, Risk Modelling, Sensitivity Analysis	**CO4**
36	Structured Learning problems, score based structure learning, constraint based structure learning, Casual Learning – casual faithful assumption, embedded faithfulness	**CO4**