



SRI KRISHNA INSTITUTE OF TECHNOLOGY

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#29, Chimney Hills, Hesaraghatta Main Road, Chikkabanavara Post, Bengaluru- 560090

Department of Information Science & Engineering

Academic Year	: 2023-24	Course Name	: Artificial Intelligence & Machine Learning
Semester	: 7	Course Code	: 18CS71
Scheme	: 2018	L: T: P: C	: 4:0:0:0
Total Contact hours	: 50	CIE Marks	: 40
Course Plan Author	: Dr. Sandeep V.M.	SEE Marks	: 60
Date	: 24 Aug 2023	Total Marks	: 100

Course Prerequisites:

- Python coding
- Data Structures
- Algorithms
- Graph theory

Learning Objectives:

- Explain Artificial Intelligence and Machine Learning
- Illustrate AI and ML algorithm and their use in appropriate applications

Course Outcomes:

CO	At the end of the course, students should be able to . . .	Blooms' Level
CO1	: Describe the problem spaces and heuristic search techniques	L3
CO2	: Demonstrate the concept learning techniques	L3
CO3	: Solve the intelligent problems through decision tree learning and ANNs	L3
CO4	: Investigate the concepts of regression and classification through Bayesian learning	L3
CO5	: Explore the various techniques of instance-based, case-based and reinforcement learning	L3

Blooms' Taxonomy:

L1	L2	L3	L4	L5	L6
Remembering	Understanding	Applying	Analyzing	Evaluating	Creating



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Program Outcomes:

PO1	:	Engineering knowledge	PO7	:	Environment and sustainability
PO2	:	Problem analysis	PO8	:	Ethics
PO3	:	Design/development of solutions	PO9	:	Individual and team work
PO4	:	Conduct investigations of complex problems	PO10	:	Communication
PO5	:	Modern tool usage	PO11	:	Project management and finance
PO6	:	The engineer and society	PO12	:	Life-long learning

Program Specific Outcomes:

PSO1:	To understand and process the principles of mathematics in the field of information science by applying different design principles.
PSO2:	To impart the knowledge by experimental methods in multidisciplinary domains.
PSO3	To inculcate communication skills and teamwork in developing the sustainable softwares by imparting professional and ethical values.

CO-PO-PSO Mapping:

CO	Program Outcomes														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	3				1		2	3	3	3	2
CO2	3	3	3	2					1		2	3	3	3	3
CO3	3	3	3	3	2				1		2	3	3	3	3
CO4	3	3	3	3	1				1		2	3	3	3	3
CO5	3	3	3	3	1				1		2	3	3	3	3
Target	2.8	3	2.8	2.8	1.4				1		2	3	3	3	2.8

Course Content (Syllabus)2

Module 1	CH
What is artificial intelligence?, Problems, problem spaces and search, Heuristic search 10 techniques	10
Textbook 1: Ch. 1-3	
Module 2	RBT: L3



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Knowledge representation issues, Predicate logic, Representation knowledge using rules. Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Candidate Elimination Algorithm, Inductive bias of Candidate Elimination Algorithm. Textbook 1: Chapters 4-6 Textbook 2: Chapter 2 (2.1-2.5, 2.7) RBT: L3	10
Module 3	
Decision Tree Learning: Introduction, Decision tree representation, Appropriate problems, ID3 algorithm. Artificial Neural Network: Introduction, NN representation, Appropriate problems, Perceptrons, Backpropagation algorithm. Textbook 2: Chapter 3 (3.1-3.4), Chapter 4 (4.1-4.5) RBT: L3	10
Module 4	
Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting, MDL principle, Bates optimal classifier, Gibbs algorithm, Navie Bayes classifier, BBN, EM Algorithm Textbook 2: Chapter 6 RBT: L3	10
Module 5	
Instance-Based Learning: Introduction, k-Nearest Neighbour Learning, Locally weighted regression, Radial basis function, Case-Based reasoning. Reinforcement Learning: Introduction, The learning task, Q-Learning. Textbook 1: Chapter 8 (8.1-8.5), Chapter 13 (13.1 – 13.3) RBT: L3	10



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Schedule of Instruction:

Class No	Topic	Date	RB T	C O	Mode
Module-1					
Introduction, Problems space and Search algorithms					
1	What's AI? An introduction	Sept 11	L1	C O1	LV
2	AI problems, AI Techniques	12	L1	C O1	LV
3	problem space as state space search	13	L1	C O1	LV
4	production systems	14	L2	C O1	LV
5	heuristic search techniques: hill climbing	19	L2	C O1	LV
6	Best First Search	20	L2	C O1	LV
7	A* algorithm	21	L3	C O1	LV
8	A* algorithm	25	L3	C O1	LV
9	Problem Reduction, AO*	26	L2	C O1	LV
10	Constraint Satisfaction	27	L3	C O1	LV
Module-2					
Knowledge representation & Concept learning					
11	Representations and Mappings	Oct 3	L1	C O2	LV
12	Approaches to knowledge representation	4	L2	C O2	LV
13	Knowledge representation issues	5	L2	C O2	LV
14	Predicate logic	9	L3	C O2	LV
15	Representation knowledge using rules.	10	L3	C O2	LV



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Class No	Topic	Date	RB T	C O	Mode
16	Concept Learning: Concept learning task	12	L2	C O2	LV
17	Concept learning as search	16	L3	C O2	LV
18	Find-S algorithm, Problems related to Find-S algorithm	17	L3	C O2	LV
19	Candidate Elimination Algorithm, Problems related to Candidate Elimination Algorithm	19	L3	C O2	LV
20	Inductive bias of Candidate Elimination Algorithm	19	L3	C O2	LV
Module-3					
Decision tree learning & ANN					
21	Decision Tree Learning: Introduction	25	L2	C O3	LV
22	Decision tree representation	26	L2	C O3	LV
23	Appropriate problems	Nov 6	L2	C O3	LV
24	Hypothesis space search	7	L3	C O3	LV
25	ID3 algorithm	8	L3	C O3	LV
26	ANN: Introduction,	9	L1	C O3	LV
27	NN representation	15	L1	C O3	LV
28	Appropriate problems	16	L3	C O3	LV
29	Perceptrons	20	L2	C O3	LV
30	Backpropagation algorithm	21	L3	C O3	LV
Module-4					
Bayesian learning					
31	Bayesian Learning: Introduction				



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Class No	Topic	Date	RB T	C O	Mode
32	Bayes theorem	22	L2	C O4	LV
33	Bayes theorem and concept learning	23	L3	C O4	LV
34	ML and LS error hypothesis	Dec 4	L3	C O4	LV
35	ML for predicting	5	L2	C O4	LV
36	MDL principle	6	L3	C O4	LV
37	Bates optimal classifier	7	L3	C O4	LV
38	Gibbs algorithm, Naive Bayes classifier	11	L3	C O4	LV
39	BBN	12	L3	C O4	LV
40	EM Algorithm	13	L2	C O4	LV
Module-5					
Instance-based learning & Reinforced learning					
41	Instance-Based Learning: Introduction	14	L2	C O5	LV
42	k-Nearest Neighbour Learning	14	L2	C O5	LV
43	Locally weighted regression	18	L2	C O5	LV
44	Radial basis function	18	L3	C O5	LV
45	Case-Based reasoning	19	L2	C O5	LV
46	Case-Based reasoning	19	L2	C O5	LV
47	Reinforcement Learning: Introduction	20	L2	C O5	LV
48	The learning task- Examples	20	L3	C O5	LV



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Class No	Topic	Date	RB T	C O	Mode
49	Q-Learning	21	L3	C O5	LV
50	Q-Learning	26	L3	C O5	LV

Textbooks:

T1	Tom M Mitchell, "Machine Learning", 1st Edition, McGraw Hill Education, 2017.
T2	Elaine Rich, Kevin K and S B Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill Education, 2017

Reference books:

R1	Saroj Kaushik, Artificial Intelligence, Cengage learning
R2	Stuart Russell, Peter Norving, Artificial Intelligence: A Modern Approach, Pearson Education 2nd Edition
R3	Aurélien Geron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, Shroff/O'Reilly Media, 2017.
R4	Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, Springer series in statistics.
R5	Ethem Alpaydm, Introduction to machine learning, second edition, MIT press
R6	Srinivasa K G and Shreedhar, "Artificial Intelligence and Machine Learning", Cengage

Web links and Video Lectures (e-Resources):

1.	https://www.youtube.com/channel/UCIF3FPfXNktzMQqPH54ZGsg
2.	https://www.youtube.com/playlist?list=PLCHuhFB1N-CkQwdYGvyDmry_2Mm5hesEH https://sites.google.com/u/8/d/1JaPB9PvZ1631-pieM6Eogt9X3Yf0zWgs/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

https://www.google.com/search?q=tic+tac+toe&oq=tic&aqs=chrome.3.69i57j69i59l3
https://playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=reg-plane&learningRate=0.03&regularizationRate=0&noise=0&networkShape=4,2&seed=0.14997&showTestData=false&discretize=false&percTrainData=50&x=true&y=true&xTimesY=false&xSquared=false&ySquared=false&cosX=false&sinX=false&cosY=false&sinY=false&collectStats=false&problem=classification&initZero=false&hideText=false



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Assessment Schedule:

S.N	Assessment Type	Content	CO	Duration	Marks	Date
1.	CIE Test 1	Module 1 & 2	1,2	1:15 hrs	30	30,31 Oct, 2 Nov
2.	CIE Test 2	Module 3 & 4	3,4	1:15 hrs	30	27,28,29 Nov
3.	CIE Test 3	Module 5	5	1:15 hrs	30	28,29,30 Dec
4.	Assignment 1	Quiz, Question and answers	1, 2,3		10	26 Oct
5.	Assignment 2	Question and answers	3, 4		10	24 Nov
6.	Seminar/ <i>any planned activity</i>	Seminar	5		10	20 Dec
7.	Semester End Examination	Modules 1,2,3,4,5	1,2,3,4,5	3:00 hrs	60	

RB – Text Book/Reference Book, ***L** – Lecture, **V**- Videos or any other mode, ***RBT** – Revised Blooms' Taxonomy, **L: T: P: C** – Theory/Lecture: Tutorial: Practical/Drawing: Credits, **SEE**: Semester End Examination, **CIE**: Continuous Internal Evaluation, **Seminar**: Group of 6-8 students, **Module** 1,2,3,4 & 5,

****The sum of total marks of three tests, two assignments, and seminar will be out of 100 marks and will be scaled down to 50 marks. (As per the scheme), CIE + SEE = 40 + 60 = 100 marks**

Faculty In charge

Course Coordinator

HoD