

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering
Scheme and Syllabus-NEP – 2023 -2024

Course Title	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING						
Course Code	21CST603						
Category	Professional Core Course (PCC)						
Scheme and Credits	No.of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	42	03
CIE Marks: 50	SEE Marks: 50		Total Max. Marks:100		Duration of SEE:03 Hours		

COURSE OBJECTIVES:

- Gain a historical perspective of AI and its foundations.
- Become familiar with basic principles of AI towards problem solving.
- Familiarize with the basics of Machine Learning & Machine Learning process, basics of Decision Tree, and probability learning and implement the same.
- Understand the working of Artificial Neural Networks concepts and algorithms.

UNIT I **09 Hours**

Introduction: What is AI, the foundations of AI, The state of the art Chapter 1 AI Text book
Intelligent agents: Agents and environments, good behavior, concept of rationality, nature of environments, structure of agents. Chapter 2 AI Text book
Problem-solving: Problem-solving agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth First search, Depth First Search. Chapter 3 AI Text book.

UNIT II **08 Hours**

Informed Search Strategies: Greedy best-first search, A*search, Heuristic functions.
Introduction to Machine-Learning-Need for Machine Learning, Relation to other Fields, Types, Challenges, Machine Learning Process, Applications. Chapter 1
Understanding Data-what is data? Big Data Analytics and types of Analytics, Big Data Analytics Framework, Descriptive Statistics, Univariate Data Analysis and Visualization Chapter 2.

UNIT III **09 Hours**

Basics of Learning theory-Introduction to Learning, Computation Learning Theory, Design of a Learning System, Introduction to concept Learning Chapter 3
Similarity Based Learning-Introduction, Nearest Neighbor Learning, Weighted KNN algorithm, Nearest Centroid Classifier, Locally Weighted Regression Chapter 4
Regression Analysis-Introduction, Introduction to Linearity, Correlation, and Causation, Introduction to Linear Regression, Validation Methods Chapter 5 to 5.4.

UNIT IV **08 Hours**

Decision Tree learning –Introduction, Decision Tree Induction Algorithms, Validating and pruning of Decision Trees Chapter 6.
Bayesian Learning-Introduction, Bayes Theorem, Classification using Bayes Model, Naive

Bayes Algorithm for Continuous Attributes, Other popular types of Naïve Bayes Classifiers
Chapter 7.

UNIT V

08 Hours

Artificial Neural Networks:

Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, Important terminologies of ANN, McCulloch-Pitts Neuron, Hebb Network, Perceptron Networks, Backpropagation Networks.

TEACHING LEARNING PROCESS: Chalk and Talk, Powerpoint Presentation, Animations, Videos

COURSE OUTCOMES: On completion of the course, student should be able to:

Course Outcomes	Statements	Blooms Level
CO1	Understanding of machine learning in relation to other fields and fundamental issues and challenges of machine learning.	L3
CO2	Apply the knowledge of searching and reasoning techniques for different applications.	L3
CO3	Apply the knowledge of classification algorithms on various dataset and compare results.	L4
CO4	Model the neuron and Neural Network, and to analyze ANN learning and its applications.	L3

TEXTBOOKS

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence, 3rd Edition, Pearson, 2015
2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford, 2021
3. S N Sivanandam, S N Deepa, Principles of Soft Computing, 3rd Edition, Wiley Publication, 2019

REFERENCES

1. Elaine Rich, Kevin Knight, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2013
2. George F Luger, Artificial Intelligence Structure and strategies for complex, Pearson Education, 5th Edition, 2011.
3. Tom Michel, Machine Learning, McGrawHill Publication.

WEB LINKS AND VIDEO LECTURES (E-RESOURCES)

1. <https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html>
2. <https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409>
3. <https://nptel.ac.in/courses/106/105/106105077/>
4. <https://www.javatpoint.com/history-of-artificial-intelligence>
5. <https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence>
6. <https://techvidvan.com/tutorials/ai-heuristic-search/>
7. <https://www.analyticsvidhya.com/machine-learning/>
8. <https://www.javatpoint.com/decision-tree-induction>
9. <https://www.hackerearth.com/practice/machine-learning/machine-learning-algorithms/ml-decision-tree/tutorial/>
10. <https://www.javatpoint.com/unsupervised-artificial-neural-networks>

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science & Engineering
Scheme and Syllabus-NEP – 2023 -2024

Course Title	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB						
Course Code	21CSL606						
Category	Professional Core Course Lab (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	24	01
CIE Marks: 50	SEE Marks: 50		Total Max. Marks: 100		Duration of SEE:03 Hours		

Course Objectives:

1. To build solutions for informed and uninformed search problems in AI.
2. To build the foundation of Machine learning.
3. To understand how to build the neural network.
4. To enable the students develop successful machine learning projects

Lab Programs	
Instructions to the Students:	
Part A: Students will be executing programs using python programming	
Part B: Implementation of mini project.	
Part A	
1.	Implement DFS and BFS Search Algorithm
2.	Implement A Star (*) Search Algorithm
3.	Implement Candidate Elimination Algorithm to get Consistent Version Space
4.	Implement K-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.
5.	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
6.	Implement the naive Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier few test data sets.
7.	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
Part B	
A mini project should be implemented by the students in teams. The maximum size of a team can be 3 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.	
The projects should be carried out in the listed areas:	
<ol style="list-style-type: none"> 1. Agriculture 2. Healthcare 3. Security 4. Smart city 5. Recommendation system 6. Behavioral Analysis 7. Games 	
The tasks when implementing mini project would be:	

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.
2. Documentation & submission of report.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

Continuous Internal Evaluation (CIE):

- CIE marks for the practical course is 50 Marks.
- The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch.
- PART B : Student should develop a mini project and it should be demonstrated in the laboratory examination (with report and presentation).
- Weightage of marks for PART A is 60% and for PART B is 40%. General rubrics suggested to be followed for part A and part B.
- Change of experiment is allowed only once (in part A) and marks allotted to the procedure part to be made zero.
- The duration of SEE is 03 hours.

Course Outcomes

At the end of the course the student will be able to:

- CO1. Design and develop solutions for informed and uninformed search problems in AI.
- CO2. Design Python programs for various machine learning algorithms.
- CO3. Apply appropriate datasets to the Machine Learning algorithms
- CO4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.
- CO5. Implement Machine learning algorithms and solve real-world problems.

Textbooks

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence, 3rd Edition, Pearson, 2015
2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford, 2021
3. S N Sivanandam, S N Deepa, Principles of Soft Computing, 3rd Edition, Wiley Publication, 2019

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2. <https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409>
3. <https://nptel.ac.in/courses/106/105/106105077/>
4. <https://www.javatpoint.com/history-of-artificial-intelligence>
5. <https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence>
6. <https://techvidvan.com/tutorials/ai-heuristic-search/>
7. <https://www.analyticsvidhya.com/machine-learning/>
8. <https://www.javatpoint.com/decision-tree-induction>
9. <https://www.hackerearth.com/practice/machine-learning/machine-learning-algorithms/ml-decision-tree/tutorial/>
10. <https://www.javatpoint.com/unsupervised-artificial-neural-networks>

Faculty Incharge

1. Asha K N
2. Arathi P

Handwritten signatures of the faculty members. The first signature is for Asha K N and the second is for Arathi P.