CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Computer Engineering)**

Semester: **VI**

Course Code: **202046702**

Course Title: **Artificial Intelligence and Machine Learning**

Course Group: **Professional Core Course**

Course Objectives: This course is designed to learn how to use Artificial Intelligence and Machine Learning techniques to create an intelligent system that can make decisions for humans. The course is designed to develop a basic understanding of problem solving, and knowledge representation methods of AI. It also covers the approaches on how to make learning by a model, how it can be evaluated, and what are all different algorithms to construct a learning model.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50/18	50/17	25/9	25/9	150/53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Artificial Intelligence and Machine learning:** Introduction Artificial intelligence, History of AI, milestones and applications Overview of Machine learning, Types of Learning: Supervised, Semi-supervised, Unsupervised and Reinforcement, Real-time applications, Difference of AI, ML and Deep learning	03
2	**AI Problems and Search:** Problems, Problem Spaces and Search: Problem as state space search, Production systems, Problem Characteristics Heuristic Search Techniques: Hill Climbing, Best First Search and A*, Problem Reduction and AO*, Constraint Satisfaction, Means-Ends Analysis Game Playing: Overview, Minimax Search, Pruning through Alpha-beta cut-offs, Iterative deepening	08
3	**Knowledge representation and Inference:** Propositional logic, Using Predicate Logic: Representing facts, Inference methods – Resolution, Forward Reasoning, Backward Reasoning	06

4	**AngularJS - Forms, Validation and Routing** Using Simple form, working with different input elements, Validation of inputs, Form Events CSS Classes, Creating Custom Validation, Introduction to Single Page Application (SPA), HTML template creation, use of routing to make SPA, AJAX using AngularJS, AngularJS Animation	**06**
5	**Supervised Learning : Regression and Classification** Regression: Introduction, Example of Regression, Common Regression Algorithms: Simple linear Regression, Multiple linear regression Classification : Introduction, Classification Model, Classification Learning Steps, Classification Algorithms: kNN, Decision Tree, Random Forest, Support Vector Machine	**10**
6	**Unsupervised Learning:** Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering, Partition methods: K-Means, Hierarchical clustering	**03**
7	**Neural Networks**: Introduction to neural network, Activation functions, Architectures, Perceptron, Multilayer Perceptron with Backpropagation.	**04**
	Total	**40**

List of Practicals / Tutorials:

1	Implement Breadth first search or Depth first search.
2	Implement solution of Water Jug problem or 8-puzzle problem using Best First Search or A*.
3	Write a program to solve a given cryptarithmetic problem.
4	Write a program to perform following operation ● Load the data from file ● Find out null and missing value ● Handle missing Value using different approach Plot the data using scatter plot, histogram, box plot
5	Write a program to implement Linear Regression.
6	Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions
7	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.e.
8	Write a program to classify IRIS data using Random Forest classifier.
9	Write a program to classify iris dataset using SVM. Experiment with different kernel functions.
10	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
11	Write a Program to implement K-Means clustering Algorithm.
12	Case study/Project: Implementation of any real time application using suitable machine learning technique.

Reference Books:

1	Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill
2	Machine Learning, Saikat Dull, S. Chandramouli, Das, Pearson
3	Vinod Chandra S.S. and AnandHarindran S., "Artificial Intelligence and Machine learning", PHI
4	Machine Learning with Python for Everyone, Mark Fenner, Pearson
5	Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
6	Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley

Supplementary learning material:	
1	NPTEL - Swayam Courses: https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2	https://nptel.ac.in/courses/106105077
3	Coursera : https://www.coursera.org/learn/machine-learning
4	https://www.coursera.org/learn/neural-networks-deep-learning

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Project

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
15%	25%	25%	15%	20%	---	

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 Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand, analyze and apply various search techniques applied to solve real world problems	**25**
CO-2	Study and use various types of logic and knowledge representation schemes	**15**
CO-3	Learn the concepts of Feature Engineering and data preprocessing	**15**
CO-4	Understand and apply machine learning techniques to solve problems in applicable domains	**35**
CO-5	Evaluate and compare algorithms based on different metrics and parameters.	**10**

Curriculum Revision:	
Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025