FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

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

Semester: **VI**

Course Code: **202040621**

Course Title: **Introduction to Machine Learning**

Course Group : **Open Elective-II**

Course Objectives: To learn principles, algorithms, and applications of machine learning from the point of view of modeling and prediction and to impart the knowledge of performing classification and reinforcement.

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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	
2	0	2	3	50/18	50/17	25/9	25/9	150 / 53

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

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Machine learning:** Introduction to Machine learning, Types of Machine Learning, AI vs. ML vs. DL, Applications of Machine Learning,	2
2	**Classification:** Overview of classification, K-Nearest neighbor, Bayesian classification, Decision tree based classification Neural Networks: Overview, Architectures, Perceptron and backpropagation, Introduction to Support Vector machine, Applications of classification	12
3	**Regression Analysis:** Introduction to regression, Correlation, Linear regression, Multiple linear regression, Applications of regression	6

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4	**Clustering:** Introduction to clustering, Types of clustering methods, K-means, Issues with clustering, Applications of clustering), Model Representation and Interpretability, Evaluating Performance of a Model	**6**
5	Evaluation Measures, Ensemble methods, Introduction to Reinforcement learning: Overview and Applications	**6**

List of Practicals / Tutorials:

1	To study any one of the Machine learning applications.
2	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Plot confusion matrix.
3	Perform the Bayesian classification for a suitable dataset.
4	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5	Write a program to classify given data using decision tree.
6	Classify iris dataset using SVM. Try different kernel functions and parameters.
7	Write a program to classify given data using Random Forest.
8	Write a program to implement Linear Regression. Test for given data set.
9	Write a program to implement multiple Linear Regression. Test for given data set.
10	Write a Program to implement K-Means clustering Algorithm
11	Case study/Project: Implementation of any real time application using suitable machine learning technique.

Reference Books:

1	Saikat Dull, S. Chjandramouli, Das, “Machine Learning”, Pearson
2	Vinod Chandra S.S. and Anand Harindran S., “Artificial Intelligence and Machine learning”, PHI
3	Mark Fenner, “Machine Learning with Python for Everyone”, Pearson
4	Anuradha Srinivasaraghavan, Vincy Joseph, “Machine Learning”, Wiley
5	U Dinesh Kumar and Manaranjan Pradhan, “Machine Learning with Python”, Wiley
6	Saikat Dull, S. Chjandramouli, Das, “Machine Learning”, Pearson

Supplementary learning Material:	
1	NPTEL - Swayam Courses: https://onlinecourses.nptel.ac.in/noc20_cs29/preview https://nptel.ac.in/courses/106105152
2	Coursera courses: Machine Learning by Andrew Ng (Stanford), Machine Learning with Python (IBM)
3	https://analyticsvidhya.com , https://machinelearningmastery.com

Pedagogy:

- Direct classroom teaching
- Assignments/Quiz
- Continuous assessment
- Seminar/Poster Presentation

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- Course Projects

Internal Evaluation :

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

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%	20%	20%	15%	5%	

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 and use heuristic search techniques for problem solving	**25**
CO-2	Learn and use various knowledge representation methods	**20**
CO-3	Implement machine learning techniques to solve problems in applicable Domains	**15**
CO-4	Evaluate and compare algorithms based on different metrics and parameters.	**10**
CO-5	Understand Regression, classification, and clustering methods for prediction	**30**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2027

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