

Branch Name:	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Program Code:	ET114
Course Title:	Machine Learning Engineering Practical
Course Code:	1ET1140201P
Pre-requisite Course:	Basic knowledge of mathematics and programming

Course Objectives:

1. The students will learn fundamental basics Machine Learning.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
1	-	-	2	2	-	-	-	-	10	25	10	25	50

List of Practical:

Sr. No.	Detail of Practicals	Contact Hours
1	Introduction to Scikit-Learn for Supervised Learning	2
2	Implementing Linear Regression from Scratch	1
3	Binary Classification with Logistic Regression	2
4	Decision Tree Classifier for Multiclass Classification	1
5	Support Vector Machine (SVM) Classification	2
6	Exploring Unsupervised Learning with K-Means	2
7	Implement Hierarchical Clustering	1
8	Implement Density-Based Clustering (DBSCAN)	1
9	Implement Principal Component Analysis (PCA)	1
10	Implement Ensemble Learning with Random Forests	1
11	Implement Convolutional Neural Network (CNN) for Image Classification	2
12	Implement Recurrent Neural Network (RNN) for Text Generation	1
13	Implement Reinforcement Learning with OpenAI Gym	1

14	Implement Evaluation Metrics for Classification Models	1
15	Implement Regression Model Evaluation Techniques	1
16	Implement Cluster Validation Measures	1
17	Implement Model Selection Techniques	1
18	Implement Hyperparameter Tuning and Optimization	1
19	Implement Transfer Learning in Image Classification	1
20	Implement Meta Learning for Few-Shot Learning	1
21	Implement Adversarial Attacks and Defenses	1
22	Implement Fairness and Bias Detection	2
23	Implement Privacy-Preserving Machine Learning	1

Reference Books:

1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, O'Reilly Media.
2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer.
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press.
4. Sebastian Raschka and Vahid Mirjalili, Python Machine Learning, Packt Publishing.
5. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press.
6. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media.
7. Richard S. Sutton and Andrew G. Barto, Reinforcement Learning: An Introduction, MIT Press.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

Sr No.	CLO	Description	Bloom's Taxonomy Level
1	CLO1	Students will be able to explain ML principles, learning paradigms, ethical considerations, and the end-to-end ML pipeline with clarity.	Understand (2)
2	CLO2	Students will be able to implement supervised models, analyze assumptions, and evaluate predictive performance using appropriate metrics.	Evaluate (5)
3	CLO3	Students will be able to apply clustering algorithms, validate cluster quality, and perform dimensionality reduction using PCA/LDA effectively.	Analyze (4)
4	CLO4	Students will be able to design ensemble models, construct basic neural networks, and interpret reinforcement learning processes.	Create (6)
5	CLO5	Students will be able to apply cross-validation, tune hyperparameters, analyze robustness, and implement advanced ML techniques responsibly.	Evaluate (5)

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CLO1	H	H	M	M	L	L	L	M	L	M		M	H	M	H
CLO2	H	H	M	H	M		L	M	L	M			H	H	H
CLO3	H				M				L	M				H	H
CLO4			H	H	H		L		M			H		H	H
CLO5	H		H	H	H	M	M	H	M			H	H	H	H
CLO6	M	L	L	L	L	H	H	M	L	M		M	L	M	M

H: High, M: Medium, L: Low