



**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY,
EAST DELHI CAMPUS,
SURAJMAL VIHAR-110092**

Semester: 7th												
Paper code: AIML411T							L	T/P	Credits			
Subject: Advances in Machine Learning							3	0	3			
Marking Scheme:												
<ol style="list-style-type: none"> Teachers Continuous Evaluation: As per university examination norms from time to time End Term Theory Examination: As per university examination norms from time to time 												
INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: As per university norms												
<ol style="list-style-type: none"> There should be 9 questions in the end term examination question paper. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit. The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks. The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required. 												
Course Objectives:												
1.	Explore and comprehend advanced ML algorithms, their strengths, and weaknesses.											
2.	Master techniques to interpret and explain ML model predictions for transparency and trust.											
3.	Build and train deep learning models to address specific tasks and datasets.											
4.	Apply the acquired knowledge to tackle real-world challenges in AI and ML domains.											
Course Outcomes:												
CO1	Analyze and apply advanced machine learning algorithms to solve complex real-world problems.											
CO2	Evaluate and interpret ML models to understand their decision-making processes.											
CO3	Implement deep learning architectures for tasks like image analysis, language processing, and sequence modeling.											
CO4	Develop expertise in applying cutting-edge ML techniques to various AI applications and domains.											
Course Outcomes (CO) to Programme Outcomes (PO)												
Mapping (Scale 1: Low, 2: Medium, 3: High)												
CO/ PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	1	2	3	3	1	1	-	1	1	-	-	2
CO2	2	2	3	3	1	1	-	1	1	-	-	2
CO3	2	2	3	3	1	1	-	1	2	-	-	2
CO4	2	2	3	3	2	1	1	1	2	-	-	2

Course Overview:

This course explores advanced topics in machine learning for B.Tech AI and ML students. It covers recent developments in algorithms, model interpretability, deep learning architectures, and applications. Students gain hands-on experience with cutting-edge ML tools and frameworks.



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Unit I

[8]

Advanced ML Algorithms: Ensemble Learning and Ensemble methods: Bagging, Boosting, and Stacking, and Kernel Methods.

Reinforcement Learning: Q Learning, HMM model, Deep Reinforcement Learning

Unit II

[8]

Model Interpretability and Explainability: Feature importance and SHAP values, LIME (Local Interpretable Model-agnostic Explanations), Explainable AI (XAI) techniques,

Unit III

[8]

Deep Learning Architectures: Convolutional Neural Networks (CNN) for image analysis, Recurrent Neural Networks (RNN) for sequence data, Transformers and Attention mechanisms

Unit IV

[8]

Applications of Advanced ML: Natural Language Processing (NLP) with BERT and GPT, Generative Adversarial Networks (GANs) for image synthesis, Transfer learning and domain adaptation

Textbooks:

1. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron
2. "Pattern Recognition and Machine Learning" by Christopher M. Bishop
3. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville

Reference Books:

1. "Interpretable Machine Learning" by Christoph Molnar
2. "Reinforcement Learning: An Introduction" by Richard S. Sutton and Andrew G. Barto
3. "Natural Language Processing in Action" by Lane, Howard, and Hapke