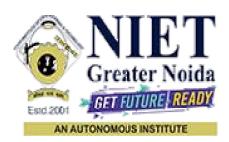**NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR**
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science and Engineering (Artificial Intelligence)

Third Year

(Effective from the Session: 2022-23)

B. TECH. THIRD YEAR

Course code	ACSML0601	L T P	Credits
Course title	MACHINE LEARNING	3 0 0	3

Course objective: To introduction to the fundamental concepts in machine learning and popular machine learning algorithms. To understand the standard and most popular supervised learning algorithm.

Pre-requisites: Basic Knowledge of Machine learning.

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO MACHINE LEARNING	8 Hours

INTRODUCTION – Learning, Types of Learning, Well defined learning problems, Designing a Learning System, History of ML, Introduction of Machine Learning Approaches, Introduction to Model Building, Sensitivity Analysis, Underfitting and Overfitting, Bias and Variance, Concept Learning Task, Find – S Algorithms, Version Space and Candidate Elimination Algorithm, Inductive Bias, Issues in Machine Learning and Data Science Vs Machine Learning.

UNIT-II	MINING ASSOCIATION AND SUPERVISED LEARNING	8 Hours

Classification and Regression, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Polynomial Regression, Decision Trees: ID3, C4.5, CART.
Apriori Algorithm: Market basket analysis, Association Rules.

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machine.

UNIT-III	UNSUPERVISED LEARNING	8 Hours

Introduction to clustering, K-means clustering, K-Nearest Neighbor, Iterative distance-based clustering, Dealing with continuous, categorical values in K-Means, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K-Mode Clustering, density-based clustering, Expectation Maximization, Gaussian Mixture Models.

UNIT-IV	PROBABILISTIC LEARNING & ENSEMBLE	8 Hours

Bayesian Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks.

Ensembles methods: Bagging & boosting, C5.0 boosting, Random Forest, Gradient Boosting Machines and XGBoost.

UNIT-V	REINFORCEMENT LEARNING & CASE STUDIES	8 Hours

Reinforcement Learning: Introduction to Reinforcement Learning, Learning Task, Example of Reinforcement Learning in Practice, Learning Models for Reinforcement – (Markov Decision process, Q Learning – Q Learning function, QLearning Algorithm), Application of Reinforcement Learning.

Case Study: Health Care, E Commerce, Smart Cities.

Course outcome: After completion of this course students will be able to:

CO1	Understanding utilization and implementation proper machine learning algorithm.	K2
CO2	Understand the basic supervised machine learning algorithms.	K2
CO3	Understand the difference between supervise and unsupervised learning.	K2
CO4	Understand algorithmic topics of machine learning and mathematically deep enough to introduce the required theory.	K2
CO5	Apply an appreciation for what is involved in learning from data.	K3

Text books:

1) Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017

2) Ethem Alpaydin, Machine Learning: The New AI, MIT Press-2016

3) Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995

4) Tom M. Mitchell, "Machine Learning", McGraw-Hill, 2010

Reference Books:

1) Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014

2) Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.

3) Ethem Alpaydin, (2004) "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press.

Fundamentals of Machine Learning for Predictive Data Anayltics: Algorithms, Worked Examples, and Case Studies 1st Edition by **John D. Kelleher**

Links:

Unit 1	https://www.youtube.com/watch?v=fC7V8QsPBec&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=2
Unit 2	https://www.youtube.com/watch?v=OTAR0kT1swg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=3 https://www.youtube.com/watch?v=OCwZyYH14uw https://www.youtube.com/watch?v=9_LY0LiFqRQ https://www.youtube.com/watch?v=EYeF2e2IKEo

	https://www.youtube.com/watch?v=_PwhiWxHK8o
	https://www.youtube.com/watch?v=wTF6vzS9fy4
	https://www.youtube.com/watch?v=lt65K-REdHw
Unit 3	https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaliy295pg6_SY5qznc77&index=4
	https://www.youtube.com/watch?v=NnlS2BzXvyM
	https://www.youtube.com/watch?v=7enWesSofhg
Unit 4	https://youtu.be/rthuFS5LSOo
	https://youtu.be/kho6oANGu_A
Unit 5	https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaliy295pg6_SY5qznc77&index=5
	Reinforcement Learning Tutorial | Reinforcement Learning Example Using Python | Edureka - YouTube
	Association Rule Mining - Solved Numerical Question on Apriori Algorithm(Hindi) – YouTube
	Q Learning Explained | Reinforcement Learning Using Python | Q Learning in AI | Edureka – YouTube