COMSATS University Islamabad
Department of Computer Science
Course Description Form (CDF)

Course Information

Course Code: **CSC354** | Course Title: **Machine Learning**
Credit Hours: **3(3,0)** | Lecture Hours/Week: **3**
Lab Hours/Week: **0** | Pre-Requisites: **None**

Catalogue Description:

This course provides the overview of machine learning along with various learning tasks. Topics include: Overview of Machine Learning; Supervised Learning; Unsupervised Learning; Reinforcement Learning; and Deep Learning.

Unit wise Major Topics:

Unit	Topic	No. of Teaching Hours
1.	Machine Learning: Definition, Concepts, Lifecycle, Applications, Landscape, Tasks, Frameworks, and Learning Paradigms.	3
2.	Supervised Learning: Decision Trees, Naive Bayes, KNN, Linear & Logistic Regression, Artificial Neural Networks, Support Vector Machines; Overfitting & Model Evaluation; and Genetic Algorithm Optimization.	18
3.	Unsupervised Learning: K-means, Principle Component Analysis (PCA), Agglomerative Clustering, Self-Organizing Maps (SOM), and Expectation Maximization.	7.5
4.	Deep Learning: Convolutional Neural Network, Recurrent Neural Networks, and LSTMs.	7.5
5.	Reinforcement Learning: Hidden Markov Model, Monte Carlo, and Q-Learning.	9
Total Contact Hours		**45**

Mapping of CLOs and SOs

Sr.#	Unit #	Course Learning Outcomes	Blooms Taxonomy Learning Level	SO
CLO-1	1	Illustrate various concept learning algorithms with suitable examples.	*Applying*	1
CLO-2	2	Apply supervised learning techniques to solve classification problems.	*Applying*	2,4
CLO-3	3	Apply unsupervised learning techniques to solve clustering problems.	*Applying*	2,4
CLO-4	4-5	Apply deep learning and reinforcement learning algorithms to environments with complex dynamics.	*Applying*	2,4
CLO-5	1-5	Develop a reasonable size project using appropriate machine learning technique.	*Creating*	2-5

CLO Assessment Mechanism

Assessment Tools	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
Quizzes	Quiz 1	Quiz 2	Quiz 3	Quiz 4	-
Assignments	Assignment 1	Assignment 2	Assignment 3	Assignment 4	-
Mid Term Exam	Mid Term Exam	Mid Term Exam	-	-	-
Final Term Exam	Final Term Exam				-
Project	-	-	-	-	Project

Text and Reference Books

Textbooks:

1. Introduction to Machine Learning, Ethem Alpaydin, MIT Press, 2010.
2. Machine Learning, Tom, M., McGraw Hill, 1997.

Reference Books:

1. Hands on Machine Learning with Scikit-Learn and TensorFlow, Aurelien Geron, O`Reilly Media, 2017.
2. Deep Learning with PyTorch – Essential Excerpts, Eli Stevens, Luca Antiga, Thomas Viehmann, Manning Publications, 2009.
3. Pattern Recognition and Machine Learning, Bishop, C., Springer-Verlag, 2007.