EE 512: Machine Learning

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| **Lecture Schedule** | See Time table | **Semester** | Fall 2019 | | |
| **Credit Hours** | Three | **Pre-requisite** | Linear Algebra | | |
| **Instructor** | Ata-ur-Rehman | **Contact** | [a.ur.rehman@uet.edu.pk](mailto:a.ur.rehman@uet.edu.pk) | | |
| **Office** |  | **Office Hours** |  | | |
| **Teaching Assistant** | None | **Lab Schedule** | N/A | | |
| **Office** | N/A | **Office Hours** | N/A | | |
| **Course Description** | In this course students will not only learn about the theoretical knowledge of the most effective machine learning techniques, but also gain practical knowledge of implementing sophisticated machine learning algorithms to apply these machine learning techniques for new problems. This course provides a broad introduction to machine learning and statistical pattern recognition. | | | | |
| **Expected Outcomes** | Students will learn   1. How to implement Machine learning algorithms (Linear and Logistic Regression, Artificial neural networks, classifiers and unsupervised learning) on MATLAB to solve real problems. 2. How to apply learning algorithms to build smart robots 3. How to use machine learning for text understanding. | | | | |
| **CLOs** | **Description** | | | **Level** | **PLO** |
| CLO1 | Identify suitable machine learning algorithms for given data related to the real-world problems. | | | 3  Apply | PLO3 |
| CLO2 | Develop working solutions for given classification and regression problems with MATLAB implementations. | | | 3  Apply | PLO5 |
| CLO3 | Develop solutions for unsupervised learning problems with the help of clustering algorithms. | | | 3  Apply | PLO3 |
| **Textbooks** | **Required**: Pattern Recognition and Machine Learning by Christopher M. Bishop, 2006  **References**: *Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems* by Aurelien Geron, O’Reilly Media, 2017. | | | | |
| **Grading Policy** | * Assignments: 30% (CLO1, CLO2, CLO3) * Midterm: 30% (CLO1) * Final: 40% (CLO1, CLO2) | | | | |

**Lecture Plan**

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| **Weeks** | Topics | **Readings** |
| **1\*** | **Introduction to Machine Learning** | **CLO1** |
| **1\*** | **Probability Theory and Linear Algebra reviewing** | **CLO1** |
| **1\*** | **Linear Model for regression with one variable** | **CLO1, CLO2** |
| **1\*** | **Linear Model for regression with multiple variables** | **CLO1, CLO2** |
| **1\*** | **Logistic regression and Regularization** | **CLO1, CLO2** |
| **3\*** | **Neural Networks** | **CLO1, CLO2** |
| **1** | **M I D T E R M** |  |
| **1\*** | **Machine Learning System Design** | **CLO1, CLO2** |
| **1\*** | **Support Vector Machine** | **CLO1, CLO2** |
| **3\*** | **Unsupervised Learning** | **CLO1, CLO2** |
| **1\*** | **Anomaly Detection** | **CLO1, CLO2** |
| **1\*** | **Large Scale Machine Learning** | **CLO1, CLO2** |
| **1\*** | **Applications and Examples of Machine Learning with advice on how to decide a suitable Learning Algorithms** | **CLO1, CLO2** |

**\* -** Tentative