Machine Learning Course Syllabus – Artificial Intelligence College – AASTMT (Al-Alamin)

Weeks	Topics

1	• Introduction:
	  • What is ML?
	  • Why use ML?
	  • Types of ML Systems
	  • Main Challenges of ML

2	• Linear Regression:
	  • The Normal Equation
	  • Computational Complexity
	
	• Gradient Descent
	  • Batch Gradient Descent
	  • Stochastic Gradient Descent
	  • Mini-batch Gradient Descent
	
	• Polynomial Regression
	• Learning Curves

3	• Regularized Linear Models
	  • Ridge Regression
	  • Lasso Regression
	  • Elastic Net
	  • Early Stopping

4	• Logistic Regression:
	  • Estimating Probabilities
	  • Training and cost function
	  • Decision Boundaries

	• SoftMax Regression

5
6
	• Prepare the Data for ML algorithms:
	  • Data Cleaning
	  • Handling Text and categorical attributes
	  • Feature Scaling
	  • Transformation Pipelines
	
	• Performance Measures:
	  • Measuring accuracy using cross validation
	  • Confusion matrix
	  • Precision and recall
	  • Precision and recall tradeoff
	  • The ROC curve

7	• Naïve Bayes Classifier:
	  • Multinomial Naïve Bayes
	  • Gaussian Naïve Bayes

8	• Support Vector Machines
9	• Decision Trees

10	• Ensemble Learning and Random Forests
	• Voting Classifiers
	• Bagging and Pasting
	  • Bagging and Pasting in Scikit-Learn
	  • Out-of-Bag Evaluation
	• Random Patches and Random Subspaces
	• Random Forests
	• Boosting
	  • AdaBoost
	  • Gradient Boosting

11	• Dimensionality Reduction • PCA

12	• Unsupervised Learning Techniques:
	  • Clustering
	  • K-means

13	Introduction to Neural Networks
14	Project Discussions
15	Revision
16	Final Exam