MACHINE LEARNING ICS502 – TERM 242
COURSE SYLLABUS

Instructor: Van Dinh Tran
Email: vandinh.tran@kfupm.edu.sa
Office Hours: 13:30 – 15:00, Sunday and Tuesday, Room 051, Building 23

Course Number	**ICS502 (3-0-3)**
Course Title	**Machine Learning**
Course Main Objectives	1. Learn the fundamentals of machine learning 2. Learn various machine learning methods such as kernel methods, support vector machines, Statistical learning, Bayesian networks, Decision trees, Random forests, K-means, Gaussian mixture model, Principal Component Analysis, and Neural Networks 3. Demonstrate the use of machine learning techniques in various applications such as classification, clustering, regression, dimensionality reduction, data visualization, model learning, and pattern recognition
Course Learning Outcomes	Upon completion of this course, students will be able to: 1. Identify various properties of machine learning algorithms 2. Describe some machine learning techniques 3. Write programs that implement specific machine learning algorithms 4. Develop a working solution for a problem using machine learning techniques 5. Describe the basics and latest advances in machine learning algorithms
Catalog Course Description	Introduction to machine learning; supervised learning (linear regression, logistic regression, classification, support vector machines, kernel methods, decision tree, Bayesian methods, ensemble learning, neural networks); unsupervised learning (clustering, EM, mixture models, kernel methods, dimensionality reduction); learning theory (bias/variance trade-offs)
Prerequisites	Knowledge of Python, Linear Algebra, Optimization, and Statistics
Content Breakdown in Credit Hours	- Computer Science: 3 credit hours - Mathematics: 0 credit hours
Textbook(s)	Not required
Reference(s)	• Machine Learning for Absolute Beginners, by Oliver Theobald • Machine Learning: A Probabilistic Perspective, by Kevin P. Murphy • Pattern Recognition and Machine Learning, by Christopher M. Bishop, Springer, 2011
Assessment Method	• Assignments and/or Quizzes (20%) • Midterm Exam (25%) • Final Exam (30%) • Term Project (25%)

Weekly Breakdown of Topics	• Introduction to Machine Learning • Instance-based Learning • Regression • Kernel methods • Support vector machines • Probabilistic graphical models: Bayesian networks • Decision trees • Ensemble learning • Clustering • Dimensionality reduction and principal component analysis • Neural Networks and Deep learning • Project presentation