

Course Name	Machine Learning		تعلم الآلة			
Course Information	Course Code	Course No.	Credit Hour	Prerequisite(s)		
	0911-1661	661	3 (3-0-6)	---		
Course Track	<input checked="" type="checkbox"/> Program Core		<input type="checkbox"/> Electives			
<p>Course Description. Machine learning (ML) uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can sift through large volumes of data at high speed to make predictions or decisions without human intervention. This course will familiarize students with a broad cross-section of models and algorithms for ML, and prepare students for research or industry application of ML techniques. The course starts with an introductory part includes mathematical basics, statistical learning theory, kernels, and Gaussian processes. Then the course demonstrates different kinds of learning methodologies including inductive, Bayes learning, decision trees, ensemble, linear regression, logistic regression, non-parametric models, Markov models, autoregressive models, support vector machine, artificial neural networks, etc. The appropriateness of these learning models will be discussed for various learning problems such as classification, clustering, regression, that fall under supervised, unsupervised, and reinforcement learning paradigms, as well as new learning paradigms, such as, self-supervised learning. Finally, an applied machine learning project implementation needs to be carried out using ML models with an emphasis to the rigorous application of validation techniques.</p>						
<p>Course Outcomes. After the completion of this course, the student will be able to:</p> <ol style="list-style-type: none">1. Describe the basic concepts and theories related to the machine learning domain of AI. [B,C]2. Distinguish and use different techniques of machines learning applicable to several problem domains. [D]3. Apply a wide variety of algorithms to simulated and real-world problems, optimize the learning models, and report on the expected accuracy of the models. [A, D]4. Evaluate machine learning algorithms and compare with alternative techniques. [E]						
Assessment Policy (TC)	Assignments	10 %	Quiz	10 %	Capstone Project	20 %
	Midterm	20 %	Final Exam	40 %		
Textbook	1. Ethem Alpaydin, "Machine Learning: The New AI", MIT Press 2016. ISBN9780262529518. 2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "Elements of Statistical Learning: Data mining, Inference and Prediction", 2 nd Ed, Springer, 2009, ISBN-978-0387848846.					
References	Aurélien Géron "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems" 2 nd Edition, O'Reilly Media, 2019. ISBN978-1492032649					