





Course Specification

— (Postgraduate Programs)

Course Title: Machine Learning

Course Code: MSCS 624

Program: Master Programme in Computer Science

Department: Computer Science

College: Computer Science and Information Technology

Institution: King Faisal University

Version: Course Specification Version Number

Last Revision Date: *Pick Revision Date.*





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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3-0-6)

zi course type	2.	Course	type
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Α.	□University	⊠ College	□Department	□Track
В.	□ Required		🛛 Elec	tive

3. Level/year at which this course is offered: : Level 2, 3 or 4

4. Course General Description:

Machine learning is a subfield of computer science that evolved from the study of pattern recognition and computational learning theory in artificial intelligence. Machine learning is the science of getting computers to act without being explicitly programmed. Applications of Machine learning can be seen in unmanned vehicles (cars and drones), finger prints, face and speech recognition, effective web search, text analysis, and understanding human genome. In this course, we will discuss about machine learning, data mining, and statistical pattern recognition. Major topics will be Supervised learning (Decision Trees, Bayesian Learning, Neural Networks, Support Vector Machines, Kernels and Unsupervised learning (clustering, dimensionality reduction, deep learning). The algorithms will be tested on real data sets using popular Machine Learning programming languages and tools. Advanced topics related to Big data analytics and machine learning will also be discussed.

5. Pre-requirements for this course (if any):

NA

6. Pre-requirements for this course (if any):

NA

7. Course Main Objective(s):

The objective of this course is to provide the student a strong foundation to understand methods of Machine Learning..

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	HybridTraditional classroom	45	100%





No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and

Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and unders	standing		
1.1	Distinguish and use different techniques of machines learning	K1	Lectures	- Quizzes - Exams - Assignments
1.2	Understand and differentiate between different concepts of machine learning	K1	Lectures	- Quizzes - Exams - Assignments
2.0	Skills			
2.1	Evaluatelearningalgorithmsandcomparewithalternative techniques	S1, S2	- Lectures	- Quizzes - Exams - Assignments
3.0	D Values, autonomy, and responsibility			
3.1	Implement machine learning algorithms on simulated and real world problems	V1	 - Lectures - Case studies -Research assignment 	Project Report and Presentation





Codo	Course Learning	Code of PLOs aligned	Teaching	Assessment
Code	Outcomes	with program	Strategies	Methods

C. Course Content:

No	List of Topics	Contact Hours
1	Introduction, Type of Machine Learning, Machine Learning Applications	3
2	Classification, Regression	6
3	Neural Networks, Learning rules, Perceptron, Delta rule, Bias	6
4	Backpropagation, Generalization, Error Functions, Training modes and overfitting	6
5	Unsupervised Learning, Reinforcement Learning, Correct (PAC) Learning,	3
6	Introduction to Clustering, Mixture Densities, k-Means Clustering	6
7	Expectation-Maximization Algorithm, Mixtures of Latent Variable Models,	3
8	Supervised Learning after Clustering,	3
9	Hierarchical Clustering, Choosing the Number of Clusters.	3
10	Deep Learning & Big Data	6
	Total	45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Continuous	10%
2.	Quiz	Continuous	10%
3.	Mid Term	8 th - 9 th	25%
4	Capstone Project	15 th	15%
5	Final Exam	16 th - 17 th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Required Textbook	Introduction to Machine Learning by Ethem Alpaydin, 2nd Edition, MIT press, 2009.
Essential References	 Bishop, Springer (October 1, 2007), ISBN-10: 0387310738, ISBN-13:978-0387310732 Machine Learning by Top Mitchell, 1st Edition, McGraw Hill, 1997, 0-07-042807-7
Supportive References	
Electronic Materials	www.anaconda.com





Other Learning Materials Research Papers in the field of Machine Learning that published in international conferences and journals.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Sufficient seats (typically 20) as per student registration required in the lecture
Technology equipment (Projector, smart board, software)	Sufficient computer terminals with required setup having the necessary software installed and configured for the students to complete assignments and projects. Data show is needed to demonstrate in the class
Other equipment (Depending on the nature of the specialty)	Not Required

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect Assessment through Teaching Evaluation
Effectiveness of students' assessment	Faculty	IndirectassessmentthroughCourseEvaluation Survey
Quality of learning resources	Students	IndirectAssessmentthroughLearningResources Survey
The extent to which CLOs have been achieved	Faculty	Direct assessment through Rubrics analyses
Other		

Other

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify) Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

