Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:	
Course Code:	CSC411
Course Title:	Machine Learning
Year/level	4th
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	(Theoretical=2hrs, Practical=2hrs), Total= 4hrs

2- Course aims:

This course aims to provide students with
- Understand machine learning as a set of analyzing concepts and techniques within different applications.
- Build the required knowledge in many recent areas like supervised and unsupervised algorithms, rough sets, genetic algorithms, and neural networks.
- Implement and elaborate different machine learning algorithms to get the required skills.
- Be an effective member of teamwork through the assigned projects and assignments.

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:

a1- State principle, achievements and shortcomings of machine learning.
a2- Use key methods, algorithms and techniques used in machine learning and its implementation.
a3- List Machine Learning techniques.
a4- Recognize machine learning tools in different contexts.

b- Intellectual skills:

On completing this course, the student should be able to:

b1- Review large datasets.
b2- Discuss machine learning techniques for supporting user decision.
b3- Confirm the applicability of machine learning techniques in novel applications.

c- Professional and practical skills:

At the end of this course, the student will be able to:

c1- Examine large data sets using suitable tools.
c2- Differentiate a range of techniques to implement an intelligent system to given specification.
c3- Differentiate and evaluate available machine learning tools, algorithms and data structures and select those appropriate to given applications.

d- General and transferable skills:

On successful completion of this course, the student should be able to:
d1- Work effectively in a team.

4- Course contents

Topics/units	Number of hours		ILO's
	Lecture hours	Practical hours	
Introduction to ML and course Roadmap	2	2	a1, a2, b1, b2, c1
Probability and statistics revision	2	2	a1, a3, a4, b1, b2, c1
Correlation and regression I	2	2	a1, a3, a4, b1, b2, c1
Correlation and regression II	2	2	a1, a3, a4, b1, b2, c1
Unsupervised learning I "Classification": Decision Trees I	2	2	a3, a4, b2, c1, c2
Unsupervised learning I "Classification": Decision Trees II	2	2	a3, a4, b2, c1, c2
Unsupervised learning III "Classification": Bayesian Classification I	2	2	a3, a4, b2, c1, c2
Unsupervised learning III "Classification": Bayesian Classification II	2	2	a3, a4, b2, c1, c2
Unsupervised learning V "Classification": K-Nearest Neighbors	2	2	a3, a4, b3, c3
Validating classification techniques	2	2	a3, a4, b3, c3
Supervised learning I	2	2	a3, a4, b2, c1, c2, d1
Supervised learning II	2	2	a3, a4, b2, c1, c2, d1

5- Teaching and learning methods

Methods	ILO's										
	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1
Lectures	√	√	√	√	√	√	√				
Practical sections	√	√	√	√	√	√	√	√	√	√	√
Self-learning											
Assays and reviews											

Discussion groups									
Brainstorming									
Blended-learning									
E-learning									

6- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help
- More quizzes to assess their ability for understanding the course
- Encourage the team work for those students with other advanced ones to increase their participation and understanding.
- Use of non-simultaneous hybrid e-learning:(Videos, presentations or PDF files uploaded on the Institute's educational platform).

7- Student assessment

Assessment method	Time	Grade weight (%)	ILOs
Written exam	2 Hours	60%	a1, a2, a3, a4, b1, b2, b3
Practical exam	45 Minutes	15%	a1, a2, a3, a4, b1, b2, b3, c1, c2, c3, d1
Oral exam	-	-	-
Mid-term exam	45 Minutes	10%	a1, a2, a3, a4, b1, b2, b3
Participations	-	5%	a1, a2, b2, b3
Quizzes	20 Minutes for each	10%	a1, a2, a3, a4, b1, b2, b3

8-List of references

8.1. Student notebooks:
- Comprehensive instructor notes ("PowerPoint slides") are available on the course web page ("Google Classroom")

8.2. Essential textbooks:
- Luis Serrano, "Grokking Machine Learning, Luis Serrano", Manning Publications Co., 2021, ISBN: 9781617295911.
- Gareth James, et al., "An Introduction to Statistical Learning with Applications in R", Springer.

8.3. Recommended textbooks:
- Luis Serrano, "Grokking Machine Learning, Luis Serrano", Manning Publications Co., 2021, ISBN: 9781617295911.

8.4. Journals, Periodical and Reports ……..etc.
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