Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:	
Course Code:	CSC461
Course Title:	Data Science
Year/level	4th Level
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	Theoretical (2), Practical (2)

2- Course aims:

This course aims to provide students with

- Understand the life cycle of the data science project
- Build the required knowledge in many recent areas like data analysis, machine learning, data visualization, and statistical analysis
- Implement and elaborate different data analytics and 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 data analysis.
a2- Use key methods, algorithms and techniques used in data preprocessing and 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 data analytics and data science	2	2	a1, a2, b1, b2, c1
The lifecycle of data science project	2	2	a1, a3, a4, b1, b2, c1
Structuring the data using Numpy arrays	2	2	a1, a3, a4, b1, b2, c1
Dealing with datasets and statistical analysis	2	2	a1, a3, a4, b1, b2, c1
Data visualization techniques	2	2	a2, b1,c3
Data preprocessing	2	2	a3, a4, b2, c1, c2
Introduction to machine learning	2	2	a3, a4, b2, c2
Supervised learning I “Regression”	2	2	a3, a4, b2, c1, c2
Supervised learning II “Classification”	2	2	a3, a4, b2, c1, c2, d1
Unsupervised learning I “Clustering”	2	2	a3, a4, b2, c1, c2
Unsupervised learning II “Association Rules”	2	2	a3, a4, b2, c1, c2, d1
Evaluation techniques	2	2	a3, a4, b3, c3, 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											✓

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:

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8.2. Essential textbooks:

- **VanderPlas, J. (2016).** ***Python data science handbook: Essential tools for working with data*****. " O'Reilly Media, Inc.".**
- **Walker, Michael.** ***Python Data Cleaning Cookbook: Modern techniques and Python tools to detect and remove dirty data and extract key insights*****. Packt Publishing Ltd, 2020.**

8.3. Recommended textbooks:

- **Grus, Joel.** ***Data science from scratch: first principles with python*****. O'Reilly Media, 2019.**

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

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8.5. Websites

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Course Coordinator: *Dr. Reham Amin*
Head of department: *Prof. Dr. Yasser F. Ramadan*
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