



Future Academy Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:

Course Code:	BSC203
Course Title:	Discrete Structures
Year/level	2 nd
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 a solid background on discrete mathematic and structures pertinent to computer science. This course covers a collections of topics such as propositional logic; set theory; set operations; mathematical reasoning; matrices; Matrix operations; counting techniques; graphs representation; tree; and related topics.

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

a- Knowledge and understanding:

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

al- **Recognize** the importance of studying discrete mathematics and its applications in computer science.

a2- **Define** the main concepts of Propositional logic and its applications in our daily life problems

a3- **Determine** the main features of using sets, sets operations and representing computer problems using sets.

a4. Recognize the different approaches for proving set identities

a5. **Present** the importance of matrices, matrices operations and representing computers problems using matrices.

a6. Recognize the main concepts of recursion and its algorithms

a7. **Define** the importance of studying graphs, trees and their algorithms and applications in computer science

b- Intellectual skills:

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

b1- **Clarify** the ideas, principles, theories, and mathematical methods that support information and computer science as a field of study.

b2. Formulate the computer software and hardware specifications using propositional logics

b3. **Describe the** concepts, plans, and designs for the presentation of computing systems by employing graphs and trees

c- Professional and practical skills:

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

c1- Analyze a wide range of computer problems using propositional logic

c2- Solve a wide range of problems using sets and matrices

c3- Utilize problems using recursion methodology

c4. Examine graphs and tree based problems in our daily life

d- General and transferable skills:

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

d1- **Display** personal responsibility by working to multiple deadlines in relation to the course requirements

d2- Demonstrate an integrated approach to the deployment of communication skills

4- Course contents

Week	Topics/units	Number	of hours	ILO's
No.		Lecture Practical		
		hours	hours	
1	Introduction to Discrete mathematics and it's applications	2	2	a1, b1,
2	Representing mathematical statements using Propositional logic and their basic operations	2	2	a1, a2, b1, b2, c1
3	Applications of propositional logic	2	2	a1, a2, b2
4	Sets and computer representation of Sets + Quiz 1	2	2	a3, a4, c1, d1
5	Sets operations and functions	2	2	a3, a4, c1, d1
6	Introduction to matrices	2	2	a5, c2
7	Midterm Exam			
8	Advanced matrices operations and representations	2	2	a5, c1, c2, d1
9	Introduction to recursion and its algorithms	2	2	a1, a6, c3, d1

10	Introduction to Graphs and their applications	2	2	a1, a7, b3
11	Graph representation+ Quiz 2	2	2	a1, a7, b3
12	Graph algorithms	2	2	a7, b3, c1, c4
13	Tree, algorithms and applications	2	2	a1, a7, b3, c1, c4
14	Final Revision	2	2	

5- Teaching and learning methods

Methods	ILOs															
	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	c1	c2	c3	c4	d1	d2
Lectures													\checkmark			
Practical sections																
Self-learning																
Problem solving																
Assays and reviews																
Discussion groups															\checkmark	
Brainstorming																
Blended-learning																
E-learning																

6- Teaching and learning methods for Low-achieving students

- Additional teaching hours for those who need help "Office Hours"
- More quizzes to assess their ability for understanding the course.
- Encourage the teamwork for those students with other advanced ones to increase their participation and understanding.

7-Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs			
Course Work (Tutorial Exercise and Assignments)	Through the semester	20	Every Week	a2, a3, a5, c2, c3, d1			
Quiz 1		5	Week#4	a1, a2, b1, c1			
Mid-term exam	1 hours	10	Week#7	a3, a4, b1, c1			

Quiz 2	Through the lecture	5	Week#11	a5, a6, a7, b3, c2, c3, c4
Written exam	2 hours	60	Week# 15-16	a2, a3, a4, a5, a6, a7, b2, b3, c2, c3

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:

 Discrete mathematics and its applications, Kenneth H.Rozen, Eighth Edition, ISBN-13: 9781260912784 ; 2019

8.3. Recommended textbooks:

 Discrete Mathematics for Computer Science, Jon Pierre Fortney, First Edition, ISBN-13: 978-0367549893, 2020

8.4. Journals, Periodical and Reportsetc.

8.5. Websites

- <u>https://www.geeksforgeeks.org/discrete-mathematics-tutorial/</u>
- <u>https://byjus.com/maths/discrete-mathematics/</u>

Course Coordinator: *Dr. Mostafa Ibrahim ElKhalil* **Head of department:** *Prof. Dr. Yasser F. Ramadan* **Date of Approval:** 24/7/2024