



**Future Academy**  
**Higher Future Institute for Specialized Technological Studies**

**Course Specification**

**1- Course information:**

<b>Course Code:</b>	BSC102
<b>Course Title:</b>	Discrete Mathematics
<b>Year/level</b>	1 <sup>st</sup>
<b>Academic Programs</b>	Computer Science Program (B.Sc.)
<b>Contact hours/ week</b>	(Theoretical =2hrs, Tutorial = 2hrs), Total=hrs

**2- Course aims:**

This course aims to provide students with a solid background on discrete mathematics 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:**

- a1- **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**

<b>Week No.</b>	<b>Topics/units</b>	<b>Number of hours</b>		<b>ILO's</b>
		<b>Lecture hours</b>	<b>Practical hours</b>	
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																
	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	c1	c2	c3	c4	d1	d2
Lectures	√	√	√	√	√	√		√	√	√	√		√		√	√
Practical sections		√	√		√	√					√	√	√			
Self-learning																
Problem solving			√		√						√	√	√			
Assays and reviews																
Discussion groups															√	√
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 Reports .....etc.

### 8.5. Websites

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

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