



# Course Specification

## (Bachelor)

Course Title: Math for Computer Science

Course Code: APIS1205

Program: Diploma in Information Security

Department: Diplomas

College: Applied College

Institution: Umm Al-Qura University

Version: 1

Last Revision Date: 14/12/2024



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## A. General information about the course:

### 1. Course Identification

1. Credit hours: ( 3 )

#### 2. Course type

- A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
- B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: ( level 2, 1<sup>st</sup> year)

#### 4. Course general Description:

This is an introductory course in discrete mathematics. The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in computer and information security. This course introduces and studies (with an emphasis on problem solving) several of the main areas of discrete mathematics such as *logic, sets, functions, number theory, and relations* to solve real world problems.

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

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

#### 7. Course Main Objective(s):

1. Appreciate the basic principles of Boolean algebra, Logic, and Set theory.
2. Understand logical arguments and logical constructs and have a better understanding of sets and functions.
3. Define statements and solve problems involving divisibility, congruence, greatest common divisor, prime numbers, and Euclidean algorithm.
4. Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.
5. Apply knowledge about discrete mathematics in problem solving.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		
4	Distance learning		



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

No	Activity	Contact Hours
1.	Lectures	60
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Understand the basic principles of logical reasoning.	K1	Course project lectures,	Quizzes, Midterm Exam, Final Exam
1.2	Understand the basic of number theory.	K1	Course project lectures,	Quizzes, Midterm Exam, Final Exam
1.3	Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.	K1	Course project lectures,	Quizzes, Midterm Exam, Final Exam
2.0	Skills			
2.1	Be able to reason mathematically to solve problems.	S1	Project	Quizzes, Midterm Exam, Final Exam, project
2.2	Be able to define connections between mathematical concepts and concrete applications.	S1	Project	Quizzes, Midterm Exam, Final Exam, project



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Be able to discuss mathematical ideas coherently with their fellow students.	S5	Lab coursework Project	Quizzes, Midterm Exam, Final Exam, project
3.0	Values, autonomy, and responsibility			

### C. Course Content

No	List of Topics	Contact Hours
1.	<b>Logic:</b> Propositional logic; Truth tables; Propositional Equivalence; Implication, equivalence, converse, inverse, contrapositive and negation; Predicates and quantifier; Rules of inference	12
2.	<b>Sets:</b> Venn diagrams; Sets operations; Cartesian product; Power sets; Cardinality of finite sets; Important numeric sets, notation, and subset relations among them	12
3.	<b>Functions:</b> Representation; Surjections, injections and bijections; Inverse; Composition; Important Numeric functions: floor, ceiling, log	12
4.	<b>Number Theory:</b> Divisibility and Modular Arithmetic; Integer Representations and Algorithms; Primes and Greatest Common Divisors; Solving Congruences; Applications of Congruences.	12
5.	<b>Relations:</b> Relations and Their Properties; n-ary Relations and Their Applications; Representing Relations; Closures of Relations; Equivalence Relations; Partial Orderings.	12
		60

### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	1 - 15	40%
2.	Midterm	1 - 15	20%
3.	Final Exam	Finals Week	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





<b>Essential References</b>	<ul style="list-style-type: none"> <li>Discrete Mathematics and Its Applications, 7th Edition, By Kenneth Rosen, Pearson, ISBN-13: 978-0073383095.</li> </ul>
<b>Supportive References</b>	<ul style="list-style-type: none"> <li>Essentials of Discrete Mathematics, 3rd Edition, By David J. Hunter, ISBN-13: 978-1284056242.</li> </ul>
<b>Electronic Materials</b>	Umm Al Qura e-learning system containing teaching resources (Slides, assignment papers, etc.)
<b>Other Learning Materials</b>	N/A

## 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with: * at least 30 seats * A data show projector connected to a PC preferably with Internet connection * sliding board * PC Lab (at least 30 seats)
<b>Technology equipment</b> (projector, smart board, software)	30 Linux/Windows PCs
<b>Other equipment</b> (depending on the nature of the specialty)	A maintenance lab + A PC lab with various operating systems such as Linux windows etc.

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students' assessment	Peers	Direct
Quality of learning resources	Quality Assurance Committee/ Curriculum Committee	Direct
The extent to which CLOs have been achieved	Instructor	Direct
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)





## G. Specification Approval

COUNCIL /COMMITTEE	Umm Al-Qura University Council
REFERENCE NO.	851141114462/190358
DATE	1446/11/22

