



Course Specifications

Course Title:	Computer Mathematics
Course Code:	MTH0102
Program:	Network technology, Programming technology and Cybersecurity
Department:	Applied Sciences
College:	Applied College
Institution:	Imam Mohammad Ibn Saud Islamic University

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A. Course Identification

1. Credit hours: 3(2 theory, 2 lab)
2. Course type
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: Second Level
4. Pre-requisites for this course (if any): None
5. Co-requisites for this course (if any): None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3hours\week	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	36
2	Laboratory/Studio	12
3	Tutorial	
4	Others (specify)	
	Total	48

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the students to a body of mathematical concepts essential for the mastery of some of the higher-level computer science courses. The course covers fundamental concepts of mathematics for computer science and engineering. It emphasizes mathematical definitions and proofs as well as applicable methods.

2. Course Main Objective

Providing the ideas and mathematical concepts essential that are widely used in computer science and engineering. In addition, this course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving problems. To achieve this goal, students will learn counting systems, sets, arithmetic operations of counting systems, logical operations, Boolean algebra, and logic gates.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
1.1	Describe the different numbering systems in computer science.	5ع, 1ع
1.2	Identify the expressions, logic gates, and operations on them.	5ع, 1ع
1.3	Define the concept of sets and operations and their properties.	5ع, 1ع
2	Skills:	
2.1	Ability to convert between different counting systems.	7م, 2م, 1م
2.2	Perform various arithmetic operations on the binary system.	7م, 2م, 1م
2.3	Apply essential logical operations to expressions and logic gates.	7م, 2م, 1م
2.4	Design of logic circuits using logic gates.	7م, 2م, 1م
2.5	Perform various operations on sets.	7م, 2
3	Values:	
3.1	Cooperation, teamwork, and professional ethics.	1ق
3.2	Take responsibility for continuous learning and continuing personal development.	2ق
3.3	Efficient and effective time management when applying acquired knowledge and skills.	3ق

C. Course Content

No	List of Topics	Contact Hours
1	<ul style="list-style-type: none"> • Counting Systems and Sets: <ul style="list-style-type: none"> ○ Counting Systems: <ul style="list-style-type: none"> ▪ Decimal System. ▪ Binary System. ▪ Hexadecimal System. ▪ Converting Between Counting Systems. ○ Computer Coding Systems: <ul style="list-style-type: none"> ▪ ASCII Code. ▪ EBCDIC Code. ▪ Unicode. 	8
2	<ul style="list-style-type: none"> • Arithmetic Operations of Binary Systems: <ul style="list-style-type: none"> ○ Binary Addition. ○ Binary Subtraction. ○ Binary Multiplication. ○ Binary Division. 	8

3	<ul style="list-style-type: none"> • Logic expressions and operations: <ul style="list-style-type: none"> ○ The Concept of Logical Expressions. ○ The Logical Operators: <ul style="list-style-type: none"> ▪ AND. ▪ OR. ▪ NOT. ▪ XOR. ▪ XNOR. ▪ NAND. ▪ NOR. ○ Tautology and Contradiction. ○ Logical Equivalence. ○ Laws of Algebra: <ul style="list-style-type: none"> ▪ Commutative Laws. ▪ Associative Laws. ▪ Distributive Laws. ▪ Idempotent Laws. ▪ Identity Laws. ▪ Complement Laws. ▪ Double Negation Laws. ▪ De Morgan's Laws. ▪ Absorption Laws. 	8
4	<ul style="list-style-type: none"> • Boolean Algebra and logic gates: <ul style="list-style-type: none"> ○ Boolean Functions. ○ Truth Tables. ○ Logic Gates. ○ Circuits Design Using Logic Gates. ○ Converting Truth Tables into Boolean Expressions. ○ Converting Digital Circuits into Boolean Expressions. ○ Minimization of Circuits. 	12

5	<ul style="list-style-type: none"> • Sets and Relations. <ul style="list-style-type: none"> ○ Sets: <ul style="list-style-type: none"> ▪ Concept of Set Theory. ▪ Set Theory Symbols. ▪ Partly Set. ▪ Inclusion and Exclusion. ▪ Equality of Sets. ▪ Universal and Empty Sets. ○ Operations on Sets: <ul style="list-style-type: none"> ▪ Union of Sets. ▪ Intersection of Sets. ▪ Complement of a Set. ▪ Difference of Sets. ▪ Symmetric Difference. 	12
Total		48

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Describe the different numbering systems in computer science.	<ul style="list-style-type: none"> - Lecture. - Discussion. - Survey. - Discovery learning. - Self-education. - Developed lecture. - Brainstorming. - Web survey. - KWL - Learning Schedule. - Mind maps. - Concept maps. 	<ul style="list-style-type: none"> - Traditional and online achievement tests. - Questions. - Assignments and assessments. - Presentations. - Discussion and debates. - Cognitive performance tests. - Achievement file.
1.2	Identify the expressions, logic gates, and operations on them.		
1.3	Define the concept of sets and operations and their properties.		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	Skills		
2.1	Ability to convert between different counting systems.	<ul style="list-style-type: none"> - Demonstration. - Developed lecture. - Discovery learning. - Peer learning. - Self-education. - Discussion. - Web survey. - Brainstorming. - Cooperative learning. - Problem Solving. - Project. - Online discussion. 	<ul style="list-style-type: none"> - Presentations. - Rating ladders. - Performance tests. - Production metrics. - Observation. - Projects. - Achievement file. - Peer assessment. - Self-calendar.
2.2	Perform various arithmetic operations on the binary system.		
2.3	Apply essential logical operations to expressions and logic gates.		
2.4	Design of logic circuits using logic gates.		
2.5	Perform various operations on sets.		
3.0	Values		
3.1	Cooperation, teamwork, and professional ethics.	<ul style="list-style-type: none"> - Demonstration. - Developed lecture. - Discovery learning. - Peer learning. - Self-education. - Discussion. - Web survey. - Brainstorming. - Cooperative learning. - Problem Solving. - Project. - Online discussion. 	<ul style="list-style-type: none"> - Presentations. - Rating ladders. - Performance tests. - Production metrics. - Observation. - Projects. - Achievement file. - Peer assessment. - Self-calendar.
3.2	Take responsibility for continuous learning and continuing personal development.		
3.3	Efficient and effective time management when applying acquired knowledge and skills.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	Week7	20%
2	Quizzes	Continuous	20%
3	Assignments	Continuous	10%
4	Participation, Attendance	Continuous	10%
5	Final Exam	Week13	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student academic advising and support:

4 office hours per week.

Contact through the LMS

Communication/interact with students via academic e-mails

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Discrete Mathematics and Its Applications 8th edition, By Kenneth Rosen, 2019, 8th Edition, ISBN13: 9781259676512
Essential References Materials	Mathematics for Computer Scientists, By Gareth J. Janacek, Mark Lemmon Close, 2011, ISBN 978-8776814267
Electronic Materials	Online resources will be provided during class lectures.
Other Learning Materials	N/A

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom included: 1. An equipped computer lab with at least 25 seats. 2. A projector connected to a PC, preferably with Internet access. 3. A vertical sliding board.
Technology Resources (AV, data show, Smart Board, software, etc.)	Computing resources (AV, data show, Smart Board, software, etc.)
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Assessment of teaching effectiveness	Student	1. Students feedback (collected through surveys) as per university policy/procedure 2. Teacher's Course report
Strategies for Evaluation of Teaching by the Instructor or by the Department	Faculty	1. Review of Course Reports 2. Review of Student feedback
Processes for Improvement of Teaching	Program Leaders	Continuous review of the course contents and teaching strategies, and utilizing the best practices
Quality of learning resources	Student and Faculty	Indirect using course evaluation and faculty survey

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	