Faculty: Information Technology	
Department: Computer Science	**Program:** Bachelor
Academic year:	**Semester:**

Course Plan

First: Course Information

Course No.: 1501220	***Course Title: Discrete Mathematics***	***Credit Hours:3***	***Theoretical:3***	***Practical:0***
Prerequisite No. and Title: 1501110	***Section No.:***	***Lecture Time:***		
Level in JNQF	***7***			
Type Of Course:	☐ ***Obligatory University Requirement*** ☐ ***Elective University Requirement*** ■ ***Obligatory Faculty Requirement*** ☐ ***Elective FacultyRequirement*** ☐ ***Obligatory Specialization Requirement*** ☐ ***Elective Specialization Requirement*** ☐ ***Ancillary course***			
Type of Learning:	☐ ***Face-to-Face Learning*** ■ ***Blended Learning (2 Face-to-Face + 1 Asynchronous)*** ☐ ***Online Learning (2 Synchronous+ 1 Asynchronous)***			

Second: Instructor's Information

Course Coordinator:		
Name:	***Academic Rank:***	
Office Number:	***Extension Number:***	***Email:***
Course Instructor:		
Name:	***Academic Rank:***	
Office Number:	***Extension Number:***	***Email:***
Office Hours:	***Sunday Monday Tuesday Wednesday Thursday***	

Third: Course Description

This course studies the mathematical elements of computer science. Topics include propositional logic; predicate logic; mathematical reasoning; techniques of proof; mathematical induction; set theory; matrices; sequences and summations; functions, relations and their properties, and elementary graph. Which aims to provide students with a strong foundation in discrete mathematics, preparing them for further studies in computer science, mathematics, and related disciplines, as well as for applying these concepts in various real-world problem-solving scenarios.

Fourth: Course Objectives

- Introducing the student to fundamental concepts of mathematical logic for analysing propositions and proving theorems.
- Guiding the student to apply operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
- Providing the student to apply rules of inference, tests for validity, and methods of proof including direct and indirect proof forms, proof by contradiction, proof by cases, and mathematical induction, and writing proofs using symbolic logic and Boolean Algebra.
- Expanding the acknowledgment of functions as relations and their properties.

Fifth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CLO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method* *Choose at least two methods*
Knowledge	**K1**	Describe the fundamental concepts of sets, relations, functions, and logic.	**PK1**	• Mid-term Exam • Quizzes • Asynchronous Activities • Final Exam
	K2	Define and explain basic mathematical ideas like sets of relations and functions, and utilize logical notations.	**PK1**	• Mid-term Exam • Quizzes • Asynchronous Activities • Final Exam
	K3	Develop an understanding of mathematical proof techniques, including induction, direct proof, and proof by contradiction.	**PK1**	• Mid-term Exam • Asynchronous Activities • Final Exam
Skills	**S1**	Solve a wide range of mathematical and real-world problems.	**PS2**	• Mid-term Exam • Quizzes • Asynchronous Activities • Final Exam
	S2	Choose the best skills to analyze and evaluate mathematical arguments and proofs.	**PS2**	• Mid-term Exam • Asynchronous Activities • Final Exam
	S3	Simplify complex mathematical scenarios using logical thinking and problem-solving skills.	**PS2**	• Mid-term Exam • Asynchronous Activities • Final Exam
	S4	Gain experience in using various techniques of mathematical proofs to prove simple mathematical properties.	**PS2**	• Final Exam

	S5	Develop the ability to think abstractly and make connections between seemingly unrelated concepts.	**PS2**	• Mid-term Exam • Final Exam
Competencies	**C1**	Collaborate effectively with peers on mathematical problem-solving, sharing ideas and insights	**PC1**	• Asynchronous Activities

*CILOs: Course Intended Learning Outcomes; PILOs: Program Intended Learning Outcomes; For each CILO, the PILO could be the same or different.

Sixth: Learning Resources

Main Reference:	***Discrete Mathematics***		
Author: Richard Johnson Baugh	***Issue No.: 8th ed.***	***Print:***	***Publication Year: 2017***
Additional Sources and Websites:	• ***Moodle*** • ***Discrete Mathematics and its Applications (6th Edition) by Kenneth H. Rosen (McGraw-Hill, Inc., New York, 2007).*** • ***https://faculty.ksu.edu.sa/sites/default/files/rosen_discrete_mathematics_and_its_applications_7th_edition.pdf***		
Teaching Type:	■ ***Classroom*** ☐ ***Laboratory*** ☐ ***Workshop*** ■ ***MS Teams*** ■ ***Moodle***		

Seventh: Course Structure

Week	Course Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
1	K1	• Syllabus overview	Face-to-Face	Lecture, in-class questions	Syllabus, Introduction pages (14-21)
		• Introduction to Discrete Mathematics • Introduction to set theory			Chapter 1: Set and Logic pages (23-33)
		• Introduction to Set Theory	Asynchronous	Vote for Assignments	
2	K1, K2	• Set properties • Sets and elements • Types of sets	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and Logic pages (23-33)
	K1, K2	• Subsets, Equality of sets Cardinality Set, Proper Subsets			
	K1, K2, C1	• Power Sets	Asynchronous	Self- Reading pdf Assignment1	
3	K1, K2	• Algebra of Sets • Differences & Complements • De Morgan's laws	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and Logic pages (23-33)
	K1, K2	• Disjoint sets & Partitions			
	K1, K2, S2,C1	• Venn Diagrams	Asynchronous	Quiz1 Self- Reading pdf	
4	K1,K2	• Logic and Propositional, Propositions and Compound Statements	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and Logic pages (35-52)
		• Basic logical operations Propositions and Truth Tables,			

		Tautologies and Contradictions			
	K1, K2, S2,C1	• Logical Equivalence	Asynchronous	Video Assignment 2	
5	K1,K2,S1,S2, S3	• Arguments • Propositional Functions	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and Logic pages (35-52)
		• Rules of inferences -1			
	K1,K2,S1,S2,S 3,C1	• Rules of inferences -2	Asynchronous	Video Assignment 3 Quiz 2	Chapter 1: Set and Logic pages (57-72)
6	K1,K2	• Quantified Statements-1	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and logic pages (57-72)
		• Quantified Statements-2			
	K1,K2,C1	• Negation of Quantified Statements	Asynchronous	Assignment 4	
7	K1,K2	• Nested Quantifiers-1	Face-to-Face	Lecture, in-class questions	Chapter 1: Set and Logic pages (57-72)
	K1,K2	• Nested Quantifiers-2			
	K2,K3,S2,S3, S4,S5,C1	• Direct Proofs-1	Asynchronous	Video Self-reading pdf	Chapter: Proof pages (83-92)
Midterm Exams					
8	K2,K3,S2,S3, S4,S5	• Direct proofs -2	Face-to-Face	Lecture, in-class questions	Chapter: Proof pages (83-92)
	K2,K3,S2,S3, S4,S5	• Indirect proofs -1			
	K2,K3,S2,S3,S 4,S5,C1	• Indirect proofs -2	Asynchronous	Video worksheet	Chapter2: Proof pages (93-95)
9	K2,K3,S2,S3,S 4,S5	• Induction Mathematics- 1	Face-to-Face	Lecture, in-class questions	Chapter2: Proof pages (109-122)
		• Induction Mathematics- 2			
	K2,K3,S2,S3,S 4,S5,C1	• Induction Mathematics	Asynchronous	Video Worksheet	
10	K1, K2, S2	• Functions as Rules, Functions onto Function	Face-to-Face	Lecture, in-class questions	Chapter 3: Functions, Sequences, and Relations pages (132-150)
		• Operations on Functions			
	K1, K2,C1	• Composition of Functions	Asynchronous	Self- Reading pdf Assignment 5	
11	K1, K2, K3, S2,S3	• Inverses of Functions	Face-to-Face	Lecture, in-class questions	Chapter 3: Functions,

		• Binary Relations			Sequences, and Relations pages (132-150)
	K1,K2,K3,S2,S3,C1	• Special types of Relations: Reflexive and Irreflexive Relations	Asynchronous	Video	Chapter 3: Functions, Sequences, and Relations pages (162-173)
12	K1, K2, K3, S2, S3	• Symmetric and Antisymmetric Relations • Transitive Relations	Face-to-Face	Lecture, in-class questions	Chapter 3: Functions, Sequences, and Relations pages (162-173)
	K1, K2, K3, S2, S3, C1	• Partial Orderings	Asynchronous	Video	
13	K1, K2, K3, S2, S3	• Equivalence Relations • Equivalence classes Partition1	Face-to-Face	Lecture, in-class questions	Chapter 3: Functions, Sequences, and Relations pages (172-180)
	K1, K2, K3, S2, S3, C1	• Operations on Binary Relations	Asynchronous	Video	
14	K1, K2, K3	• Inverses & Compositions 1 • Inverses & Compositions 2	Face-to-Face	Lecture, in-class questions	Chapter 3: Functions, Sequences, and Relations pages(172-180)
	K2,K3,S2,S3,S4,S5	• Revision	Asynchronous		Chapter2: Proof pages (109-122)
Final Exams					

*Teaching procedures: (Face-to-Face, synchronous, asynchronous). ** Teaching methods: (Lecture, video….).
***Reference:(Pages of the book, recorded lecture, video….)

Eighth: Assessment Methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Specific Course Output to be assessed **If any CILO will not be assessed in the course, mark NA.								
				K1	K2	K3	S1	S2	S3	S4	S5	C1
First Exam												
Second Exam												
Mid-term Exam		30		✓	✓	✓	✓	✓	✓		✓	
Participation												
Asynchronous Activities		15		✓	✓	✓	✓	✓	✓			✓
Quizzes		5		✓	✓		✓					
Assignments												
Group presentation												
Final Exam		50		✓	✓	✓	✓	✓	✓	✓	✓	
Total out of 100		100										

Ninth: Course Policies

- All course policies are applied to all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).

Approval	Name	Date	Signature
Head of Department			
Faculty Dean			