Course Specification
— (Bachelor)

Course Title:	**Discrete Mathematics**
Course Code:	**283Math-3**
Program:	**B.Sc. of Computer Science + Information Systems**
Department:	**Computer Science and Information Systems**
College:	**Computer Science and Information Systems**
Institution:	**Najran University**
Version:	**2**
Last Revision Date:	**17-05-2025**

Table of Contents

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: (3/2)

4. Course General Description:

This course introduces numbers systems, Logic: Conjunctions, logical equivalence and arguments; Methods of proofs, Sets, operations on sets, Cartesian products. Relations: Equivalence relations, Order relations, Functions, Counting principles, Permutations and Combinations. It also covers Trees: Tree diagrams, Types of trees, Graphs: Undirected graphs, Directed graphs, Adjacency matrix for directed graph, Planar graphs, and Isometry.

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

6. Co-requisites for this course (if any):

7. Course Main Objective(s):

The main objective of this course is understanding numbers systems, Logic: Conjunctions, logical equivalence and arguments; Methods of proofs. Sets, operations on sets, Cartesian products. Know relations: Equivalence relations, Order relations, Functions, Counting principles, Permutations and Combinations. Recognize trees: Tree diagrams, Types of trees. Finally, Understand graphs: Undirected graphs, Directed graphs, Adjacency matrix for directed graph, Planar graphs, Isometry.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		**45**

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe different **number systems** used in discrete mathematics.		Lecture Cooperative learning Problem solving Brainstorming	Assignments Quiz Midterm Exam Final Exam
1.2	Explain fundamental concepts of **propositional logic** including logical equivalence and methods of proof.			
1.3	Define **sets**, **relations**, and **functions**, and explain their basic properties.			
1.4	Identify types of **graphs** and **trees**, and describe their key characteristics			
1.5	State fundamental **counting principles**, including permutations, combinations, and the binomial theorem.			
2.0	**Skills**			
2.1	Apply rules of **logic** to analyze and construct valid arguments and mathematical proofs.		Lecture Cooperative learning Problem solving Brainstorming	Assignments Quiz Midterm Exam Final Exam
2.2	Perform **operations on sets** and **analyze relations** such as equivalence and order relations.			
2.3	Construct and interpret **graphs and trees**, including adjacency matrices and planar representations.			
2.4	Solve problems using **counting techniques** such as the multiplication rule, permutations, and combinations.			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Work effectively with in groups and independently			

C. Course Content

No	List of Topics	Contact Hours
1.	Numbers systems	6
2.	Logic: Conjunctions, logical equivalence and arguments; Methods of proofs	9
3.	Sets, operations on sets, Cartesian products. Relations: Equivalence relations, Order relations, Functions	12
4.	Types of trees, Graphs: Undirected graphs, Directed graphs, Adjacency matrix for directed graph, Planar graphs, Isometry.	12
5.	Counting principles, Permutations and Combinations, Trees: Tree diagrams and Binomial theorem.	6
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exams	6-8 11-13	20 20
2.	Assignments & Quizzes	During classes	10
3.	Final Exam	16-18	50
4.	Final Exam	16-18	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- K. H. Rosen, Discrete Mathematics and its Applications, McGraw- Hill, 5th Edition (2004).
Supportive References	- S. S. Epp, Discrete Mathematics with Applications, PWS-Cant Pub. Co., 1990. - L. Lesniak, Discrete Structures, Logic, and Computability, Jones and Bartlett.
Electronic Materials	None
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 30 seats.
Technology equipment (projector, smart board, software)	- Blackboard Platform - Mathematica Program Projector
Other equipment (depending on the nature of the specialty)	**N/A**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Student Questionnaire (Indirect)
Effectiveness of Students assessment	Peer Reviewer	Rubrics (Indirect)
Quality of learning resources		
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	