Course Specification
(Bachelor)

Course Title:	**Discrete Mathematics**
Course Code:	**425MATH-3**
Program:	**B. Sc. in Mathematics**
Department:	**Mathematics**
College:	**Science**
Institution:	**Jazan University**
Version:	**2024**
Last Revision Date:	**9/2024**

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:

Level 6 / Year 3

4. Course general Description

This course is designed to provide students with

- **Counting:** Basics of counting, permutations, combinations, the binomial theorem.
- **Graphs:** Graphs and graph models, graph terminology and special types of graphs, connectivity, paths, cycles, Hamiltonian graphs Hamiltonian paths, Hamiltonian cycles, Euler graphs, Euler paths, shortest- path problems, planar graphs, graph coloring.
- **Trees**: spanning trees, binary trees, searching trees.
- **Boolean Algebra:** Definition, properties, Boolean functions, logic gates, logic circuits.

5. Pre-requirements for this course (if any): 221 Math

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

7. Course Main Objective(s)

After finishing the course, the student is expected to be familiar with the following:

- Principal of counting
- Permutations,
- Combinations
- Binomial theorem
- Graph theory
- Trees
- Boolean algebra

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	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	42
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	3
5.	Others (specify)	
	Total	45

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	Distinguish mathematical concepts relevant to permutations, combinations, binomial theorem, graphs, sub graphs, trees, sub trees, Boolean algebra, gates, and circuits	K1	Lectures, Web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.2	Identify background science, features and structure of mathematical problem of counting, degrees of a graph, cycles and paths, undirected and directed, representation of a graph by a matrix, planar graphs and non-planar graphs, input and output gates, and Combinations of circuits	K2	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
1.3	Explain notations and concepts required for the solution of Mathematical problem in proofs of counting, degrees of a graph, cycles and paths, undirected and directed, representation of a graph by a matrix, planar graphs and non-planar graphs, input and output gates, and Combinations of circuits	K3	Lectures, Web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	Skills			
2.1	Apply theoretical, computational or practical aspect relevant to counting, degrees of a graph, cycles and paths, undirected and directed representation of a graph by a matrix , planar graphs and non-planar graphs, input and output gates, and Combinations of circuits	S1	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Compute numerical quantities for various parameters to approximate the solution in counting, degrees of a graph , cycles and paths, undirected and directed , representation of a graph by a matrix , planar graphs and non-planar graphs , input and output gates, and Combinations of Characterize and distinguish between various rules and statistical techniques in counting, degrees of a graph , cycles and paths, undirected and directed , representation of a graph by a matrix , planar graphs and non-planar graphs, input and output gates, and Combinations of circuits.	S2	Lectures, problem solving, web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.3	Apply various mathematical rules, techniques and theorems in Application in counting, degrees of a graph, cycles and paths, undirected and directed, representation of a graph by a matrix, planar graphs and non-planar graphs, input and output gates, and Combinations of circuits.	S3	Lectures, problem solving, web based work, Classroom discussions	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.4	Solve mathematical problem using critical thinking in counting, degrees of a graph, cycles and paths, undirected and directed, representation of a graph by a matrix, planar graphs and non-planar graphs, input and output gates, and Combinations of circuits	S4	Lectures, problem solving, web based work, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Cultivate a mathematical attitude and nurture the interest.	V1	Group work, problem solving, web based work	Assignments and discussion
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.	V2	Group work, problem solving, web based work	Assignments and discussion
3.3	Inculcating values and ethics in thought, expression and deed.	V3	Group work, problem solving, web based work	Assignments and discussion

C. Course Content

No	List of Topics	Contact Hours
1	**Counting**	8
2	**Graphs:**	21
3	Trees,	8
4	**Boolean Algebra**	8
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Homework and Quiz	3	5
2	First exam	6	20
3	Homework and Quiz	10	5
4	Second exam	12	20
5	Final exam	15	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 , (2007). Discrete Mathematics And Its Applications, 7th Edition, McGraw-Hill
Supportive References	R.P.Grimaldi, (1998), **Discrete and Combinatorial Mathematic** applied Introduction, Addison-Waesly.

Electronic Materials	Web sites dedicated to Graph Theory And Its Applications on the internet
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom.
Technology equipment (projector, smart board, software)	Data show; Smart Board.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader	Indirect (Course Evaluation Survey)- Indirect peer evaluation
Effectiveness of students assessment	Students, Program assessment committee	Direct/ Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	**Board Of Mathematics Department**
REFERENCE NO.	**2417**
DATE	**29/03/1446 A. H.; 2/10/2024 A. D.**