Course Specification
(Bachelor)

Course Title:	**Discrete Mathematics**
Course Code:	**107 Math-3**
Program:	**BS in Computer and Network Engineering**
Department:	**Computer Science**
College:	**Computer Science and Information Technology**
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 4 / Year 2

4. Course general Description:

Mathematical logic: Definitions, examples, truth tables of compound propositions, propositional equivalence, logical equivalence and De Morgan's Law

Basic structures: functions of integers numbers, some important functions, floor and ceiling functions and its properties

Basics of counting: matching, counting principles, permutations, combinations, binomial theorem, Pascal's identity and triangle, generalized permutations and combinations

Advanced counting techniques: iterative relations, recurrence relations, solving linear recurrence relation, generating functions, use of generating functions in counting

Graphs: initial concepts in graphic theorem, corridors and cycles, definitions of graphs (directed and undirected) and examples, basic terminology, degree of a vertex, isolated and pendant, in-degree and out-degree, representing graphs, adjacency matrices, incidence matrices

Trees: trees, trees generated, binary trees, investigation of tree in corridors problem, rooted tree
Boolean Algebra: Boolean functions, logic gates

5. Pre-requirements for this course (if any): None

6. Co- requirements for this course (if any): None

7. Course Main Objective(s):

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

Identify functions of integer numbers and some relations on integer number.
Identify permutations and combinations.
Identify generating functions and their applications in counting.
Identify graphics, corridors, and their applications.
Identify trees method and its uses in investigation.

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	40
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	5
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 mathematical logic, basic structures, and basics of counting, advanced counting techniques, graphs, trees, and Boolean algebra.	K1	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
1.2	Identify background science, features and structure of mathematical problem in mathematical logic, basic structures	K2	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
1.3	Explain notations and concepts required for the solution of Mathematical problem in basics of counting, advanced counting techniques, graphs, trees, and Boolean algebra	K3	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, 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 mathematical logic, basic structures	S1	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
2.2	Compute numerical quantities for various parameters to approximate the solution in Basics of counting, advanced counting techniques, graphs, trees, and Boolean algebra.	S2	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
2.3	Apply various mathematical rules, techniques and theorems in Application on mathematical logic, basic structures.	S3	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
2.4	Solve mathematical problem using critical thinking in basics of counting, advanced counting techniques, graphs, trees, and Boolean algebra.	S4	Lectures, Web based work, Classroom dissections.	Written exam (Problem solve, MCQ, Proof, Short answer), Quizzes, Assignments.
3.0	Values, autonomy, and responsibility			
3.1	Cultivate a mathematical attitude and nurture the interest.	V1	Presentations Group Discussion	Assignments 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, Discussion	Assignments, Discussion
3.3	Inculcating values and ethics in thought, expression and deed.	V3	Group work, problem solving, web based work, Discussion	Assignments, Discussion

C. Course Content

No	List of Topics	Contact Hours
1.	Mathematical Logic	6
2.	Basic structures	6
3	Basics of counting	6
4	Advanced counting techniques	6
5	Graphs	6
6	Trees	6
7	Boolean Algebra	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home Assignment and Quiz	3	5%
2.	Mid Exam 1	6	20%
3.	Home Assignment and Quiz	10	5%
4	Mid Exam 2	11	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	Discrete Mathematics and its applications, K.H. Rosen, McGraw-Hill, 6th edition (2007)
Supportive References	• List Essential References Materials (Journals, Reports, etc.) • Discrete and Combinatorial Mathematics: An applied introduction, R.P. Grimaldi, Addison Wesley, 5th edition (2004) • Donald Knuth et. Al, Concrete Mathematics: A foundation for computer science, Addison Wesley, 2nd edition (1994) • John Dossey et al, Discrete Mathematics and its applications, Addison Wesley 5th edition (2006)
Electronic Materials	Web sites dedicated to Discrete mathematics available on the internet.
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom equipped with projector, whiteboard, and sufficient seating arrangements.
Technology equipment (Projector, Smart board, Software)	Power point presentations and other hand-outs posted on the course web site.
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.; 02/10/2024 A. D.**