Course Specification
(Bachelor)

Course Title:	**Foundations of Mathematics**
Course Code:	**221MATH-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 3 /Year 2

4. Course general Description

This course is designed to provide students with

- **Mathematical Logic:** Statements, open statements, truth values, simple and compound statements, negation, logical connectives and their T-F values, implications, logical equivalence, tautologies, methods of giving proofs.
- **Sets**: Representation of sets, subsets, power set, partitions of set, algebraic operations on sets and their properties.
- **Relations:** Cartesian product of sets and properties, binary relations and properties, domain, Range and inverse of a set, partially and totally ordered relations, equivalence relations, equivalence classes, partitions and equivalence relations on a set, congruent of modulo n.
- **Mappings:** Definition of mapping and its properties, types of mapping, composition of mappings
- **Binary operations on Set:** Definition, examples and properties of binary operations, semi-group, monoid.

5. Pre-requirements for this course (if any): 101 Math

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 the following:

- Basic concepts in Mathematics.
- Skills necessary to understand the logical and abstract Mathematics.
- Methods to understand hypotheses, theories and proofs.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100%
2.	E-learning		
3.	Hybrid		

No	Mode of Instruction	Contact Hours	Percentage
	• 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 logic propositions, the truth values of propositions, sets, set operations, Relations, Mappings and binary operations.	K1	Lectures, problem solving, web based work, Classroom discussion.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
1.2	Identify required notations and concepts in General Mathematics.	K2	Lectures, problem solving, web based work, Classroom discussion.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.0	Skills			
2.1	Apply aspects relevant to logic propositions, the truth values of	S1	Lectures, problem solving, web based	Written exam (Problem solve, MCQ,

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	propositions, sets, set operations, Mappings and binary operations.		work, Classroom discussion.	true/false, Proof, Short answer), Quizzes, Assignments.
2.2	Apply various math rules, techniques and theorems in proving a mathematical assumption.	S3	Lectures, problem solving, web based work, Classroom discussion.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.3	Solve mathematical problems using critical thinking and problem solving in General Mathematics.	S4	Lectures, problem solving, web based work, Classroom discussion.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
3.0	Values, autonomy, and responsibility			
3.1	Cultivate a mathematical attitude and nurture the interest	V2	Group work, problem solving, web-based work.	Assignments, Discussion.
3.2	Inculcating values and ethics in thought, expression and deed.	V3	Group work, problem solving, web based work.	Assignments, Discussion.
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C. Course Content

No	List of Topics	Contact Hours
1.	Mathematical logic	8
2.	Methods of proofs	8
3	Sets	7
4	Functions	6
5	Relations	8

6	Binary operations on a set.	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	Foundations of Discrete Mathematics, P. Fletcher, H. Hoyle and C.W. Batfy, PWS-Cant Pub. Co. (1991).
Supportive References	**1-** Introduction to Abstract Algebra, W. K. Nicholson, PWS-Kent publishing Co. Boston, 1993. **2-** Discrete Mathematics and Applications, K. H. Rosen McGraw-Hill, 5th Edition (2004). Elements of Logic and Modern Algebra, M. V. shat and M.L. Bhave, Published by S. Chond and Company Ltd. H. O. Ram Nagar, New Delhi, (1986).
Electronic Materials	Web sites dedicated to Fundamental of Mathematics.
Other Learning Materials	None.

2. Required Facilities and equipment

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

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	Instructor	Direct/Indirect
The extent to which CLOs have been achieved	Students, Faculty members	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.**