Course Specification
(Bachelor)

Course Title:	**Abstract Algebra 1**
Course Code:	**222MATH-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 hours**

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

This course is designed to provide students with

- **Group:** Definition of group and Abelian groups, Illustrative Examples, General properties of group, cyclic groups, subgroups (Theories and examples).
- **Permutation**s: (S_n, o) Symmetric group of order ***n*** for any natural number ***n***, cyclic permutation with length ***n***.
- **Transpositions**: Even and odd permutations, Alternative group, A subgroup of Even permutations of group S_n.
- **Normal subgroups**: Cosets, Quotient group. Factor Group ***G / N*** for any normal subgroup ***N*** of ***G***.
- **Homomorphism:** Homomorphism of groups, Basic homomorphism theorems, Isomorphism.

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

- Identify the basic idioms in abstract algebra.
- Development of student logical and abstract thinking.
- Development of the student's ability to deal with abstract proofs.

Training students to solve exercises and applications.

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 Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	K1	Lectures, solving problem, 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 in Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	K2	Lectures, solving problem, 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 Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	K3	Lectures, solving problem, Classroom discussions .	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.0	Skills			
2.1	Apply theoretical, computational or practical aspect relevant to Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations,	S1	Lectures, solving problem, Classroom	Written exam (Problem solve, MCQ, true/false, Proof, Short

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Homomorphism and Isomorphism, problems		discussions .	answer), Quizzes, Assignments.
2.2	Compute numerical quantities for various parameters to approximate the solution in Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	S2	Lectures, solving problem, Classroom discussions .	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.3	Apply various math rules, techniques and theorems in Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	S3	Lectures, solving problem, Classroom discussions .	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.4	Solve mathematical problem using critical thinking in Groups, Abelian Groups, Subgroups, Cyclic Subgroups, Normal Subgroups, Quotient Groups, Permutations, Homomorphism and Isomorphism, problems.	S4	Lectures, solving problem, Classroom discussions .	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.	V1	Group work and interactive discussion.	Assignments, Discussion.
3.2	Realize the importance of responsibilities through different modes of practice, competition and related activities.	V2	Group work and interactive discussion.	Assignments, Discussion.
3.3	Inculcating values and ethics in thought, expression and deed.	V3	Group work and interactive discussion.	Assignments, Discussion.

C. Course Content

No	List of Topics	Contact Hours
1.	Groups – Abelian groups-Illustrative examples	8
2.	General properties of groups,- Cyclic groups, -Subgroups	12

3	Permutations -Symmetric group of order n	8
4	Normal subgroups – Cosets- Quotient group.	9
5	Homomorphism of groups- Basic homomorphism theorems- Isomorphism	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	J. B. Fraleigh, A First Course in Abstract Algebra, 6th Ed. Addison – Wesley Publishing Co. London, 1998.
Supportive References	I. N. Herstein , Topics in Algebra , John Wiley and Sons,1975 . M. V. Shat and M.L. Bhave, Elements of logic and Modern algebra, Published by S. Chand and Company Ltd (1986).H.O.: Ram Nagar , New Delhi.
Electronic Materials	Web sites dedicated to Abstract Algebra.
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)	

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.**