



Course Specification

(Bachelor)

Course Title: Abstract algebra 2
Course Code: 323MATH-3
Program: B.Sc. in Math
Department: Mathematics
College: Science
Institution: Jazan University
Version: 2024
Last Revision Date: 9/2024

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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 5 / Year 3

4. Course general Description

Course Description

This course is designed to provide students with

- **Ring:** Definition and theorems, commutative ring, zero divisors, ring and its group of unit, integral domain, field
- **Subrings and Ideals:** Subrings, ideals and relationship between them, factor ring.
- **Homomorphism and Isomorphism of Ring:** Definition, theorem and examples, kernel and image of homomorphism, first, second and third isomorphism theorems and its applications.
- **Euclidean Rings and Ring of Polynomials:** Euclidean rings, unique factorization theorem, construction of ring polynomials, roots of ring of polynomials over a field, polynomial ring on the field of rational numbers.

Field Extension: Simple algebraic extension and simple transcendental extension, finite extension, algebraic closure, splitting fields, finite field.

5. Pre-requirements for this course (if any): Math 222

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:

- Concept of ring which is an extension of the group
- Concept of subring, which is an extension of the subgroup, ideal which is an extension of the normal subgroup and factor ring which is an extension of the factor group.
- Concept of homomorphism of rings as an extension of homomorphism of groups

Types of rings, fields and their extensions.

1. 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
	<ul style="list-style-type: none"> Traditional classroom E-learning 		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
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 the ring theory and field.	K1	Lectures, 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 ring theory and field.	K2	Lectures, 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 the ring theory and field.	S1	Lectures, problem solving, web based work, Classroom discussion.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments
2.2	Apply various mathematical rules, techniques and theorems in ring theory, and field.	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 in ring theory and field.	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			



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Realize the importance of responsibilities through different modes of practice, competition and related activities.	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
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Rings	9
2.	Subrings and ideals	9
3	Homomorphism and isomorphism	9
4	Euclidean rings and rings of polynomials	9
5	Extension field	9
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	<ul style="list-style-type: none"> Topics in Algebra. Herstein, I.N. New York: John Wiley and sons, 1977. A First course in Abstract Algebra, J. B. Fraleigh, 7thEdition, Addison-Wesley Publishing Co. London, 2003.
Supportive References	<ul style="list-style-type: none"> A survey of modern Algebra. MacLane, S. and Birkhoff, G. New York: Macmillan, 1977. Algebra, S. Lang, 3rdEdition, Addison-Wesley, 1993. Basic Algebra, Paul, M. Cohn, Springer-Verlag N.y. 2002.



Electronic Materials	Websites related to ring theory available on the internet
Other Learning Materials	

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)	None

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.

 