Course Specification
— (Postgraduate)

Course Title: Abstract Algebra
Course Code: **MATH630**
Program: **Master Program in Mathematics**
Department: **Mathematics**
College: **Science**
Institution: **University of Tabuk, KSA**
Version: **2**
Last Revision Date:**1/12/1443 H**

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A. General information about the course:

Course Identification

1. **Credit hours:**	3 H

2. Course type

a.	University ☐	College ☐	Department ☒	Track ☐	Others ☐
b.	Required ☒	Elective ☐			

3. Level/year at which this course is offered: Level-1

4. Course general Description
In this course, we will study some basic fundamentals of Abstract Algebra. Some important properties, theorems, problems, and applications will be also discussed.

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

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

7. Course Main Objective(s)
Main objectives include the following:

1. Identify and recall the basic concepts of Abstract Algebra to develop an interest in concerned subject.
2. Describe the basic definitions and theorems on Rings.
3. How to form a quotient ring with the help of Ideals and rings.
4. Discuss the concept of ring homomorphism and by using this concept learn all three isomorphism theorems of rings.
5. Introduce the concepts of chain conditions on rings.
6. Explain the basic definitions and theorems on Modules.
7. Introduce the concepts of direct sums, direct products, direct summands and by using these concepts, learn about free modules, Projective and Injective modules.

1. 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		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	3 H /week

2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
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** **The students will be able to:**			
1.1	Demonstrate the advanced concepts and fundamentals of Abstract Algebra and related topics.	K1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Research project, presentation, interactive discussion and participation, Survey
1.2	Describe a good understanding in advance topics of Abstract Algebra.	K2		
1.3	Enhance an understanding of the definitions, relations and advanced applications of Abstract Algebra.	K3		
2.0	**Skills** **The students will be able to:**			
2.1	Apply the daily life applications of Ideals and Rings.	S1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Home works, Assignments, Research project, presentation, interactive discussion and participation, Surveys.
2.2	Analyze the results in practical examples.	S2		
2.3	Using the concepts of chain conditions on rings.	S3		
3.0	**Values, autonomy, and responsibility** **The students will be able to:**			
3.1	Demonstrate responsibility during	V2	Lectures, Group works,	Research

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	work individually or in group research.		Presentations, Classroom discussion, Seminar, Case study, problem solving session	project, Home works, Assignments, presentation, interactive discussion and participation, Surveys.
3.2	Writing technical reports on Abstract Algebra individually or in group.	V2		

C. Course Content

No	List of Topics	Contact Hours
1	Basic definitions and theorems on Rings.	3
2	Quotient rings, Ring homomorphisms.	3
3	Isomorphism theorems of rings (statements and proofs).	3
4	Chain conditions on rings.	3
5	Basic definitions, and theorems on Modules.	3
6	Submodules and factor modules.	3
7	Sum and intersection of sub-modules, Homomorphisms.	3
7	**Mid-Exam #**	--
8	Factor theorems.	3
9	Inverse image of submodules.	3
10	Direct summands.	3
11	Free modules.	3
12	Direct and indirect sums.	3
13	Direct products.	3
14	Projective and Injective modules.	3
15	Exactness, Semi-simple modules.	3
16+17	**Revision & Final Exam**	
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home works and Assignments	Weekly basis	20%
2.	Mid-term exam	7th week	25%
3.	Presentation and discussion	During the Semester	15%
4.	Final Exam	At End of Semester	40 %

*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	1. Gregory T. Lee, Abstract Algebra, Springer Gewerbestrasse 11, 6330 Cham, Switzerland (2018). 2. Asma Ali ،Mohammad Ashraf ،Vincenzo De Filippis, Algebra and Related Topics with Applications, Springer Nature Singapore (2022)
Supportive References	1. Thomas Q. Sibley, An Introduction to Abstract Algebra, American Mathematical Society (2021).
Electronic Materials	Saudi digital library
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room with a capacity of 30 students and equipped with White Board, Library
Technology equipment (projector, smart board, software)	Overhead projector and internet connection.
Other equipment (depending on the nature of the speciality)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct and Indirect
Effectiveness of students' assessment	Teacher	Direct
Quality of learning resources	Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Teacher, Quality Committee	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval Data

Council / Committee	Approval by the Department Council
Reference No.	DEPARTMENT COUNCIL NO (26)
Date	11/9/1444 H