Course Specification

(Postgraduate Programs)

Course Title:	**Rings and Modules**
Course Code:	**MAT 7122**
Program:	**Doctor of Philosophy in Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**V1**
Last Revision Date:	**None**

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A. General information about the course:

1. Course Identification:

1. Credit hours:					
4 (4 Lectures, 0 Lab, 0 Tutorial)					
2. Course type					
A.	☐ University	☐ College	☒ Program	☐ Track	☐ Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2 / Year 1)					
4. Course General Description:					
This course describes the most important ideas and theoretical results on Rings and Modules.					
5. Pre-requirements for this course (if any):					
None					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
The main objective of this course is to study important algebraic structures of rings and modules, with a discussion of some important classes of rings such as Noetherian and Artinian rings, and important classes of modules, such as injective and projective modules, in addition to tensor product and groups algebra.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours

1.	Lectures	60
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify).....	0
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To name mathematical structures of rings and modules.	K1, K2	4 lecture hours\week	Direct: Regular Exams
1.2	To list important classes of rings and modules	K1, K2	4 lecture hours\week Self-study	Direct: Short Quizzes
...				
2.0	Skills			
2.1	To develop techniques of proof in modules and sub-modules.	S1, S2	Self-study	Direct: • Participations Short Quizzes
2.2	To develop oral communication and technical writing skills through rings and modules.	S3	Real-life problems	Direct: Homework and Mini projects
2.3	To use Internet in searching for Noetherian and Artinian Modules	S4	Real-life problems	Direct: Short Quizzes
2.4	To demonstrate deep proofs in Algebras and Tensors products.	S1, S2	Self-study	Direct: Participations

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	To execute works independently	V1, V3	Personal questions	Direct: Participation
3.2	To cooperate with team work	V1, V2	Teamwork and class discussions.	Direct: Homework and Mini projects

C. Course Content:

No	List of Topics	Contact Hours
1.	Basic Definitions of Modules, Submodules, Quotient Modules	12
2.	Direct Product and Direct Sum of Modules, Free Modules, Modules Over PID,	12
3.	Noetherian and Artinian Modules, Composition Series and Jordan-Holders Theorem,	12
4.	Simple Rings and Simple Modules, Semi-Simple Rings, Wedderburn-Artin Theorem, Exact Sequences, Projective and Injective Modules,	12
5.	Tensor Products, Flat Modules, Algebras, Semi-Simple, Simple and Division Algebras, Group Algebra and Maschke's Theorem.	12
Total		60

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homeworks, Quizzes, Mini-projects	During the semester	30%
2.	Midterm	Week 8-9	30%
3.	Final Exam	Week 15	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	• T. Hungerford, *Algebra*, GTM, Springer-Verlag 1974. (Main Reference)
Supportive References	• D. Dummit & R. Foote, *Abstract Algebra*, John Wiley 2004.
Electronic Materials	

Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each class room should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (Projector, smart board, software)	▪ **The rooms are equipped with data show and Smart Board.**
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 Course Responsible Peer Reviewer	**Direct:** Questionnaire. **Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report. **Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
The extent to which CLOs have been achieved	• Students • Faculty (Academic Advisory- GCC) • Program Leaders • Course Responsible	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review. **Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL
REFERENCE NO.	8/1446
DATE	05/04/1446 (08/10/2024)