

# Course Specifications

<b>Course Title:</b>	<b>Rings and fields theory</b>
<b>Course Code:</b>	<b>2304342-3</b>
<b>Program:</b>	<b>Bachelor of Mathematics</b>
<b>Department:</b>	<b>Mathematics Department</b>
<b>College:</b>	<b>Jamoum University College</b>
<b>Institution:</b>	<b>Umm Al-Qura University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 3 credit hours			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered:</b> 8 <sup>th</sup> level			
<b>4. Pre-requisites for this course (if any):</b> Introduction to Group Theory			
<b>5. Co-requisites for this course (if any):</b>			

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	13.5	30
2	Blended	13.5	30
3	E-learning	7	15
4	Correspondence	7	15
5	Other	4	10

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	15
4	Others (specify)	0
	<b>Total</b>	45
<b>Other Learning Hours*</b>		
1	Study	70
2	Assignments	15
3	Library	0
4	Projects/Research Essays/Theses	0
5	Others (specify)	20
	<b>Total</b>	105

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b>
<b>2. Course Main Objective</b> The main purpose of this course are learning basic facts of rings and fields theory, integral domains, the field of quotients of an integral domain, rings of polynomials

over a field and their factorizations, the evaluation homeomorphisms for field theory, homeomorphisms and factor rings, Prime and maximal ideals, introduction to extension fields. Namely the topics are:

1-Rings and fields: Definitions and basic examples substructures of rings, ideals 2-Integral domain, the field of fractions of an integral domain.

3-Rings of polynomials and factorization of polynomials over a field 4-Isomorphism theorems of rings

5-Prime and Maximal ideals

6-Introduction to extension fields and some examples of finite fields.

7-Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.1	To name Rings and fields	
1.2	To list Integral domain, and describe the field of fractions of an integral domain	
1.3	to reproduce and outline Rings of polynomials and factorization of polynomials over a field	
1.4	to recall Isomorphism theorems of rings	
1.5	To define Prime and Maximal ideals	
1.6	To define extension fields and outline some examples of finite fields.	
1.7	to recall Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)	
<b>2</b>	<b>Skills :</b>	
2.1	To interpret Rings and fields	
2.2	To analyze Integral domain, and evaluate the field of fractions of an integral domain	
2.3	to develop and reconstruct Rings of polynomials and factorization of polynomials over a field	
2.4	to use Isomorphism theorems of rings	
2.5	To calculate Prime and Maximal ideals	
2.6	To reconstruct extension fields and develop some examples of finite fields.	
2.7	to construct Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)	
2.8	Demonstrate communication skills with the teacher and other students in the class.	
2.9	Reading and solving basic facts of algebraic structures.	
<b>3</b>	<b>Competence:</b>	
3.1	Demonstrate communication skills with the teacher and other students in the class. Show ability for mental mathematics.	
3.2	Reading and solving basic facts of algebraic structures such	

CLOs		Aligned PLOs
	as rings and fields. Show ability for mental mathematics.	

### C. Course Content

No	List of Topics	Contact Hours
1	Rings and fields: Definitions and basic examples substructures of rings, ideals	6
2	Integral domain, the field of fractions of an integral domain	6
3	Rings of polynomials and factorization of polynomials over a field	6
4	Isomorphism theorems of rings	6
5	Prime and Maximal ideals	6
6	Introduction to extension fields and some examples of finite fields.	6
7	Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)	9
Total		45

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	To name Rings and fields	Lectures, Tutorials and exams	Written Exams
1.2	To list Integral domain, and describe the field of fractions of an integral domain		
1.3	to reproduce and outline Rings of polynomials and factorization of polynomials over a field		
1.4	to recall Isomorphism theorems of rings		
1.5	To define Prime and Maximal ideals		
1.6	To define extension fields and outline some examples of finite fields.		
1.7	to recall Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)		
2.0	<b>Skills</b>		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.1	To interpret Rings and fields	Lectures and Tutorials	Written Exams
2.2	To analyze Integral domain, and evaluate the field of fractions of an integral domain		
2.3	to develop and reconstruct Rings of polynomials and factorization of polynomials over a field		
2.4	to use Isomorphism theorems of rings	Lectures, Tutorials and exams	Mid-term Exams
2.5	To calculate Prime and Maximal ideals		
2.6	To reconstruct extension fields and develop some examples of finite fields.		
2.7	to construct Principal ideal domain (PID), Unique factorization domain (UFD), Euclidean domain (ED)		
2.8	Demonstrate communication skills with the teacher and other students in the class.		
2.9	Reading and solving basic facts of algebraic structures.		
3.0	<b>Competence</b>		
3.1	Demonstrate communication skills with the teacher and other students in the class. Show ability for mental mathematics.	Working together Brainstorming: A Method of solving problems in which all members of a group suggest ideas and then discuss them.	Group study to do homework
3.2	Reading and solving basic facts of algebraic structures such as rings and fields. Show ability for mental mathematics.		

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Test (1)	6 <sup>th</sup> week	20%
2	Midterm Test (2)	12 <sup>th</sup> week	20%
3	Homework + Reports + Quizzes	During the semester	10%
4	Final Examination	End of semester	50%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Each group of students is assigned to a particular faculty where he or she will provide academic advising during specific academic hours. Each staff will provide at least one session/week.
- There will be an academic advisor how will be a responsible for helping the student by doing the general supervision.
- The people in the library will support the students during the time of the course.

## F. Learning Resources and Facilities

### 1.Learning Resources

Required Textbooks	- The book: A First Course in Abstract Algebra, 7th Edition 7th Edition, by John B. Fraleigh; Publisher: Pearson; 7 edition (November 16, 2002) Language: English ISBN-10: 0201763907:ISBN-13: 978-0201763904 - Abstract Algebra by D. Dummit and R. Foote; Publisher: Wiley; 3 edition (July 14, 2003) Language: English ISBN-10: 0471433349 ISBN-13: 978-0471433347 -Algebra by Hungerford;Publisher: Springer; 8 edition (February 14, 2003) Language: EnglishISBN-10: 0387905189ISBN-13: 978-0387905181
Essential References Materials	- Modern Algebra: An Introduction 6th Edition, by John R. Durbin; Publisher: Wiley; 6 edition (December 31, 2008) Language: English ISBN-10: 0470384433 ISBN-13: 978-0470384435 - Notes on Algebraic Structures by: Peter J. Cameron: <a href="http://www.maths.qmul.ac.uk/~pjc/notes/algstr.pdf">http://www.maths.qmul.ac.uk/~pjc/notes/algstr.pdf</a>
Electronic Materials	1. ABSTRACT ALGEBRA ONLINE STUDY GUIDE ( <a href="http://www.math.niu.edu/~beachy/abstract_algebr">http://www.math.niu.edu/~beachy/abstract_algebr</a>

	<a href="#">a/study_guide/contents.html</a> ) 2. <a href="https://en.wikipedia.org/wiki/Ring_theory">https://en.wikipedia.org/wiki/Ring_theory</a> 3. <a href="https://en.wikipedia.org/wiki/Algebraic_structure">https://en.wikipedia.org/wiki/Algebraic_structure</a> 4. <a href="http://mathworld.wolfram.com/topics/RingTheory.html">http://mathworld.wolfram.com/topics/RingTheory.html</a> 5. <a href="http://mathworld.wolfram.com/topics/FieldTheory.html">http://mathworld.wolfram.com/topics/FieldTheory.html</a>
<b>Other Learning Materials</b>	Microsoft Excel

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	-The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	-Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	none

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))



**Assessment Methods** (Direct, Indirect)

## **H. Specification Approval Data**

<b>Council / Committee</b>	
<b>Reference No.</b>	
<b>Date</b>	