



**Jordan University of Science and Technology**  
**Faculty of Science & Arts**  
**Mathematics Department**

MATH741 Abstract Algebra (1)

First Semester 2017-2018

**Course Catalog**

3 Credit Hours. In this course we study the following subjects : Rings, zero-divisors and units, Polynomial Rings, Matrix Rings, integral domain and fields, Ring Homomorphism., Ideals. (right ideals and left ideals ). Factor Rings, Isomorphism Theorems for rings. Maximal ideals, Prime ideals, Radicals of ideals, Primary ideals .The Chinese Remainder Theorem for rings. Euclidean Domains. Principle Ideal Domains. Unique Factorization Domains, Irreducibility Criteria., Module, submodules, Module Homomorphism. Isomorphism Theorems for modules. Prime submodules , maximal submodules, primary submodules . Generation of modules direct sum and free modules. The Chinese Remainder Theorem for module Noetherian R-modules. Finitely generated R-modules.

**Text Book**

<b>Title</b>	Abstract Algebra
<b>Author(s)</b>	David S. Dummit and Richard M. Foote
<b>Edition</b>	3rd Edition
<b>Short Name</b>	TextBook
<b>Other Information</b>	2003

**Course References**

Short name	Book name	Author(s)	Edition	Other Information
Ref 1	Algebra; an Approach via Module Theory	William A. Adkins and Steven H. Weintraub	1st Edition	Graduate Texts in Mathematics, Vol. 136. Springer-Verlag, 1992.
Ref 2	Algebra	Hungerford, Thomas W.	1st Edition	Graduate Texts in Mathematics, Vol. 73. Springer-Verlag, 2003.
Ref 3	Algebra.	Lang, S.	1st Edition	Graduate Texts in Mathematics, Vol. 211. Springer-Verlag, 2002.

**Instructor**

Name	Dr. Khaldoun Al-Zoubi
------	-----------------------

Office Location	23451
Office Hours	Sun : 10:30 - 11:30 Mon : 10:00 - 11:30 Tue : 11:30 - 13:00 Wed : 11:30 - 12:30 Thu : 09:30 - 10:30
Email	kfzoubi@just.edu.jo

<b>Class Schedule &amp; Room</b>
Section 1: Lecture Time: Thu : 14:30 - 17:30 Room: SF05

<b>Tentative List of Topics Covered</b>		
<b>Weeks</b>	<b>Topic</b>	<b>References</b>
Weeks 1, 2	Chapter 7 Introduction to Rings: Basic Definitions and Examples. Examples: Polynomial Rings, Matrix Rings. zero-divisors and units (left zero-divisor, right zero-divisor, left inverse , right inverse) , integral domain and fields, division ring, Subrings	From <b>TextBook</b>
Week 3	Chapter 7: Polynomial Rings, Ring Homomorphism, Properties of Ideals. (right ideals and left ideals )	From <b>TextBook</b>
Weeks 4, 5, 6	Chapter 7: Factor Rings, Isomorphism Theorems for rings (First Ring Isomorphism Theorem, Second Ring Isomorphism Theorem, Third Ring Isomorphism Theorem, Fourth Ring Isomorphism Theorem) Maximal ideals, Prime ideals, Radicals of ideals, Primary ideals, The Chinese Remainder Theorem.	From <b>TextBook</b>
Week 7	Chapter 8: Euclidean Domains. Principle Ideal Domains. Unique Factorization Domains.	From <b>TextBook</b>
Week 8	Chapter 9: Definitions and Basic Properties. Polynomial Rings Over Fields I. Polynomial Rings that are U.F.D.s.	From <b>TextBook</b>
Week 9	Chapter 9: Irreducibility Criteria. Polynomial Rings Over Fields II.	From <b>TextBook</b>
Week 10	Chapter 10: Basic Definitions and Examples, Submodules , Module Homomorphism.	From <b>TextBook</b>
Weeks 11, 12	Chapter 10: Quotient Modules, Isomorphism Theorems for modules (First module Isomorphism Theorem, Second module Isomorphism Theorem, Third module Isomorphism Theorem, Fourth module Isomorphism Theorem	From <b>TextBook</b>
Weeks 13, 14	Chapter 10: Prime submodules , maximal submodules, primary submodules	From <b>TextBook</b>
Week 15	Chapter 10: Generation of modules direct sum and free modules, The Chinese Remainder Theorem for modules, Noetherian R-modules , Finitely generated R-modules	From <b>TextBook</b>
Week 16	Final Exam Week	

<b>Mapping of Course Objectives to Program Student Outcomes<sup>1</sup></b>	<b>Assessment method</b>
Define, illustrate, and apply the concepts of rings, division ring integral domain, fields. [3a, 1e]	1st Exam
Define, illustrate, and apply the concepts of, left (right ) zero-divisor, left (right ) inverse, Ideals, factor rings and ring homomorphism. [2a, 1e]	1st Exam
Define, illustrate, and apply the concepts of Maximal ideals, prime ideals, primary ideals, Radicals of ideals. [1a, 1e]	
Learn the rings of polynomials and factorization of polynomials over a field. [1a, 1e]	
Define, illustrate, and apply the concepts of Euclidean Domains (ED), Unique Factorization Domains and Principle Ideal Domains. [1a]	
Define, illustrate, and apply the concepts of modules, submodules , module homomorphism and isomorphism theorems for modules [2a, 1e]	
Define, illustrate, and apply the concepts of prime submodules, primary submodules, maximal submodules. [2a, 1e]	
Define, illustrate, and apply the concepts of Noetherian modules and Finitely generated modules [1a]	

<b>Relationship to Program Student Outcomes (Out of 100%)</b>										
a	b	c	d	e	f	g	h	i	j	k
70				30						

<b>Evaluation</b>	
<b>Assessment Tool</b>	<b>Weight</b>
1st Exam	25%
2nd Exam	25%
final Exam	50%

Date Printed: 2017-11-28

Abstract Algebra, Fourth Edition by John A. Beachy and William D. Blair. ISBN 10: 1-4786-3869-9 ISBN 13: 978-1-4786-3869-8 c 2019. Waveland Press, Inc. 4180 IL Route 83, Suite 101 Long Grove, Illinois 60047 (847) 634-0081 www.waveland.com. Between the third and fourth editions of the Abstract Algebra, some problems were shifted from this Study Guide to the text. I have added some new problems to replace them. I have also added an index to the solved problems.