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 sume and free modules. The Chinese Remainder Theorem for module Noetherian R-modules. Finitely generated R-modules.

Text Book	
Title	Abstract Algebra
Author(s)	David S. Dummit and Richard M. Foote
Edition	3rd Edition
Short Name	TextBook
Other Information	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
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Class Schedule & Room
Section 1: Lecture Time: Thu : 14:30 - 17:30 Room: SF05

Tentative List of Topics Covered

Weeks	Topic	References
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 **TextBook**
Week 3	Chapter 7: Polynomial Rings, Ring Homomorphism, Properties of Ideals. (right ideals and left ideals)	From **TextBook**
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 **TextBook**
Week 7	Chapter 8: Euclidean Domains. Principle Ideal Domains. Unique Factorization Domains.	From **TextBook**
Week 8	Chapter 9: Definitions and Basic Properties. Polynomial Rings Over Fields I. Polynomial Rings that are U.F.D.s.	From **TextBook**
Week 9	Chapter 9: Irreducibility Criteria. Polynomial Rings Over Fields II.	From **TextBook**
Week 10	Chapter 10: Basic Definitions and Examples, Submodules , Module Homomorphism.	From **TextBook**
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 **TextBook**
Weeks 13, 14	Chapter 10: Prime submodules , maximal submodules, primary submodules	From **TextBook**
Week 15	Chapter 10: Generation of modules direct sume and free modules, The Chinese Remainder Theorem for modules, Noetherian R-modules , Finitely generated R-modules	From **TextBook**
Week 16	Final Exam Week	

Mapping of Course Objectives to Program Student Outcomes[1]	Assessment method
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]	

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

Evaluation	
Assessment Tool	**Weight**
1st Exam	25%
2nd Exam	25%
final Exam	50%

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Abstract Algebra, including group, ring, and field theory. - Binary operations. Definitions and Examples of commutative and associative binary operations.Â Abstract Algebra, including group, ring, and field theory. - Binary operations. Definitions and Examples of commutative and associative binary operations. In algebra, which is a broad division of mathematics, abstract algebra (occasionally called modern algebra) is the study of algebraic structures. Algebraic structures include groups, rings, fields, modules, vector spaces, lattices, and algebras. The term abstract algebra was coined in the early 20th century to distinguish this area of study from the other parts of algebra.