King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
SYLLABUS
Semester II, 2022-2023 (222)

(Dr. Abdeslam MIMOUNI)
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Course #: **Math 323 (Formerly named Math 345)**
Title: **Modern Algebra I**
Prerequisite: **MATH 210 or (ICS 253, ICS 254)**
Textbook: **Contemporary Abstract Algebra by J. A. Gallian, eighth edition (2013)**
Objectives: **This course is intended to introduce students to fundamental concepts and techniques in abstract algebra and to provide students with appropriate background for more advanced courses in mathematics.**

Week #	Date	Chapter	Topics
1	Jan. 15-19	2 3	Groups, Definitions, Examples, Elementary Properties Finite Groups, Subgroups: Terminology and notation, Subgroup Tests
2	Jan. 22-26	3 4	Examples of Subgroups Cyclic groups : Properties of Cyclic Groups
3	Jan. 29- Feb. 02	4 5	Classification of Subgroups of Cyclic Groups Permutation groups: Notation&Definition, Cycle notation
4	Feb.05-09	5 6	Properties of Permutations Isomorphisms: Examples& Definition, Cayley's Theorem
5	Feb. 12-16	6 7	Properties of Isomorphisms, Automorphisms Cosets and Lagrange's theorem: Properties of Cosets, Lagrange's Theorem & Consequences
6	Feb. 19-21	8 9	External Direct Product: Definition, Examples, Properties of Ex. Dir. Prod. Normal subgroups and Factor groups: Normal Subgroups, Factor groups
7	Feb.26- Mar. 02	9 10	Internal Direct Products Group Homomorphisms: Definition, Examples, Properties
			Saudi Foundation Day 22-23 February
8	Mar. 05-09	10 11	The First Isomorphism Theorem Fundamental Theorem of Finite Abelian Groups: The Fundamental Theorem, The Isomorphism Classes of Abelian Groups
9	Mar. 12-16	12	Introduction to rings: Definition, Examples, Properties of Rings, Subrings
10	Mar. 19-23	13	Integral Domains: Definition, Examples, Fields, Characteristic of a Ring.
11	Mar. 26-30	14	Ideals and Factor Rings: Ideals, Factor Rings, Prime and Maximal Ideals.
12	Apr. 02-06	15	Ring Homomorphism: Definition, Examples, Properties of Ring Homomorphisms , The Field of Quotients
13	Apr. 09-13	16	Polynomial Rings: Notation and Terminology, The Division Algorithm and Consequences.
			Eid Al-Fitr Holidays 14-27 April
14	Apr. 30- May 04	17	Factorization of Polynomials: Reducibility Tests, Irreducibility Tests, Unique Factorization in Z[x]
15	May 7-11	18	Divisibility in Integral Domains: Irreducibles, Primes, Unique Factorization Domains.
	May 14-15	Catch-up	Normal Wednesday and Thursday classes

(*) No Makeup is given under any circumstance. If a student misses an assessment for a legitimate reason (e.g., medical emergency), his final grade will be determined based on the non-missed assessments.
Learning Outcomes: Upon completion of this course, students should be able to
• Define normal subgroups, factor groups, homomorphisms
• Discuss the fundamental theorem of finite Abelian groups
• Explain integral domains and fields
• Define ideals, factor rings and ring homomorphisms
• Explain factorization of polynomials over a field, factor rings of polynomials over a field
• Define irreducible elements and unique factorization
• Discuss principal ideal domains
Academic Integrity: All KFUPM ethic policies apply in this course. University Policy on Attendance: A DN grade will be awarded to any student who accumulates 9 absences
Office Hours and Contact Information: Office hours: UTR 9:00 a.m. – 10:00 a.m

Homework

Chapter 2	***Exercises: 22-34-52***
Chapter 3	***Exercises: 4-12-32***
Chapter 4	***Exercises: 14-20-42***
Chapter 5	***Exercises: 22-26-38***
Chapter 6	***Exercises: 2-10-42***
Chapter 7	***Exercises: 6-12-48***
Chapter 8	***Exercises: 6-22-38***
Chapter 9	***Exercises: 10-38-48***
Chapter 10	***Exercises: 6-14-20***
Chapter 11	***Exercises: 2-8-22***
Chapter 12	***Exercises: 4-8-12***
Chapter 13	***Exercises: 14-30-46***
Chapter 14	***Exercises: 14-16-26***
Chapter 15	***Exercises: 12-24-52***
Chapter 16	***Exercises: 4-10-20***
Chapter 17	***Exercises: 10-20-30***
Chapter 18	***Exercises: 4-12-28***

Grading Policy.

Homework: Out of: 40.
Major Exam 1: February 20, 2023, Chapters 2-6. Out of: 80.
Major Exam 2: March 13, 2023, Chapters 7-11. Out of: 80.
Final Exam: Announced by the Registrar. Out of: 100.
Total: Out of: 300.
A+: 270 (90% or more), F: <150 (50%)