King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Syllabus of Math 345(T162)
Dr. Othman Echi

Title: Modern Algebra I

Textbook: Contemporary Abstract Algebra by J. A. Gallian, eighth edition (2013)

Objectives: Review of basic group theory including Lagrange's Theorem. Normal subgroups, factor groups, homomorphisms, isomorphisms theorems, fundamental theorem of finite Abelian groups. Examples and basic properties, integral domains and fields, ideal and factor rings, homomorphisms. Polynomials, factorization of polynomials over a field, factor rings of polynomials over a field. Irreducible elements and unique factorization, principal ideal domains.

Learning Outcomes: Upon completion of this course, students should be able to**:**

- recognize a given group as a cyclic group;
- work with congruence relations and their main examples in groups and rings, namely cosets;
- understand and work with quotient constructions in the context of groups and rings;
- demonstrate knowledge of the fundamental theorem of finite abelian groups;
- recognize integral domains and fields;
- apply the theory of principal ideal domains to the factorization of polynomials over a field into its irreducible factors.

Grading Policy:

Exam1	Exam2	Test1	Test2	Test3	Test4	Attendance	HW-Presentations	Final Exam
20%	20%	5%	5%	5%	5%	5%	10%	25%

Syllabus

Chap.	Title	Week
2	Groups, Definitions, Examples, Elementary Properties	1

3	Finite Groups, Subgroups: Terminology and notation, Subgroup Tests	
3 4	Examples of Subgroups Cyclic groups: Properties of Cyclic Groups	2
4 5	Classification of Subgroups of Cyclic Groups Permutation groups: Notation & Definition, Cycle notation	3
5 6	Properties of Permutations Isomorphisms: Examples& Definition, Cayley's Theorem	4
6 7	Properties of Isomorphisms, Automorphisms Cosets and Lagrange's theorem	5
8 9	External Direct Product Normal subgroups and Factor groups: Normal Subgroups, Factor groups	6
9 10	Internal Direct Products Group Homomorphisms	7
10 11	The First Isomorphism Theorem Fundamental Theorem of Finite Abelian Groups	8
12	Introduction to rings	9
13	Integral Domains	10
14	Ideals and Factor Rings	11
15	Ring Homomorphism	12
16	Polynomial Rings	13
17	Factorization of Polynomials	14
18	Divisibility in Integral Domains	15

Exams:

Exam 1: March 18, 2017, Material: Chapters 2,3,4,5,6,7,8 (10:00—12:00 AM)

Exam 2: April 29, 2017, Material: Chapters 9,10,11,12,13,14 (10:00—12:00 AM)

Final Exam (Comprehensive) June 06, 2017, 09:00 -12:00 PM

Attendance: KFUPM attendance policy will be enforced. A **DN grade** will be awarded to every student who accumulates 9 unexcused absences.

Academic Integrity: All KFUPM policies regarding ethics apply to this course