King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Math 232 – Syllabus
2016-2017 (161)
Dr. Othman Echi

Title: Introduction to Sets and Structures

Textbook: Mathematical Proofs, A transition to Advanced Mathematics (3rd edition: International Edition) by Gary Chartrand et al., Pearson 2014.

Description: Elementary logic. Methods of proof. Set theory. Relations and functions. Finite and infinite sets. Equivalence relations and congruence. Divisibility and the fundamental theorem of arithmetic. Well-ordering and axiom of choice. Groups, subgroups, symmetric groups, cyclic groups and order of an element, isomorphisms, cosets and Lagrange's Theorem.

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

- Draw and interpret truth-tables. Learn terms "tautology", "contradiction", "implication" and other logical terminology.
- Predicate calculus, quantifiers, negation of quantifiers.
- Comprehend basic set theory, drawing Venn diagrams, intersection and union, indexed sets and generalized union and intersection.
- Apply methods of mathematical proof such as induction and contradiction.
- Apply methods based on basic set theory, and use of counterexamples in proofs.
- Explain relations and functions, one-to-one, onto functions and bijections.
- Explain the nature and uses of equivalence classes and quotient structures.
- Explain concepts of divisibility, primality, congruence and congruence classes.
- Explain the nature of mathematical infinity, cardinality, Cantor's theorem. The statement and meaning of the continuum hypothesis. Cantor-Shroeder-Bernstein Theorem.
- Explain introductory number theory and the uses of mathematical proof.
- Explain the definition and examples of groups. Introductory group theory. The statement and proof of Lagrange's theorem.

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Grading Policy:

Exam1	Exam2	Test1	Test2	Test3	HW	Final Exam
20%	20%	10%	10%	10%	5%	25%

Syllabus

Chapter	Title	Week(s)
1	Logic	2
2	Sets	1
3	Direct Proof and Proof by Contrapositive	1
4	More on Direct Proof and Proof by Contrapositive	1
5	Existence and Proof by Contradiction	1
6	Mathematical Induction	1
8	Equivalence Relations	2
9	Functions	1
10	Cardinalities of Sets	2
11	Proofs in Number Theory	1
13	Proofs in Group Theory	2

Exams:

Material of Exam 1: Chapters 1, 2, 3, 4: November 05, 2016 (10:00—12:00 AM)

Material of Exam 2: Chapters 5, 6, 7, 8: December 03, 2016 (10:00—12:00 AM)

Final Exam (Comprehensive) January 14, 2017, 07:00 -10:00 PM

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