

King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
MATH 210 Syllabus
Semester 202
Instructor: Prof. Jawad Abuhlail

Course Title: Introduction to Sets and Structures

Textbook: Mathematical Proofs: A Transition to Advanced Mathematics (3rd edition), by Chartrand, Polimeni, and Zhang (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

1. Use basic results of set theory involving concepts such as intersection and union, indexed sets, relations, functions, and cardinality.
2. Use basic results on divisibility and congruences, including the fundamental theorem of arithmetic.
3. Use basic results of group theory, including Lagrange's theorem.
4. Use concepts of elementary logic such as negation, implication, quantifiers, and other logical terminology.
5. Construct mathematical proofs using rigorous methods such as induction and contradiction.

Grading Policy:

Online Midterm Exam Written Test	Date: TBA Time: TBA	Material: Chapters 2-7	25%
Final Exam Written Test	Date: TBA Time: TBA	Material: Comprehensive	40%
Homework	Scanned and submitted online via email & OneNote		15%
Classwork	It is based on quizzes, assignments, or other activities determined by the instructor.		20%

Academic Integrity: All KFUPM policies regarding ethics apply to this course. (See the Undergraduate Bulletin).

Attendance: DN grade shall be given to any student whose unexcused absences exceed **20%** of the lecture.

Course Plan

Chapter	Title	Number of weeks	Homework Exercises
2	Logic	2	4, 14 (a,c), 18(b), 24(a,c,e), 32(c), 40(b), 48, 54, 62, 68, 72, 78
3	Sets	1	2, 16, 30, 36, 48, 64
4	Direct Proof and Proof by Contrapositive	1	4, 12, 24, 32, 42
5	More on Direct Proof and Proof by Contrapositive	1	10, 18, 28, 46, 58, 68, 75
6	Existence and Proof by Contradiction	1	6, 20, 34, 48, 50
7	Mathematical Induction	1	4, 12, 24, 34, 42, 62
In-Person Midterm exam , Chapters: 2-7; 21.3.2021, 7:00 PM (Online)			
9	Equivalence Relations	1	4, 22, 28, 34, 40, 42
10	Functions	1	8, 14, 26, 32, 48, 58
11	Cardinalities of Sets	2	4, 10, 20, 24, 28, 41(a)
12	Proofs in Number Theory	1	6, 24(a), 34, 38(c), 56, 62(d), 68
14	Proofs in Group Theory	2	12, 23, 24, 25, 28, 32(a,c), 40, 41, 45
-	Well-ordering and Axiom of Choice	1	Handouts