KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al-Imam Mohammad Ibn Saud Islamic University
College of Sciences
Department of Mathematics & Statistics

المملكة العربية السعودية
وزارة التعليم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Teaching Language
MAT	**220**	**Elements of Sets and Structures**	**3**	**2**	**0**	**2**	**6**		**3[1]**	**English**

A. Course Description

This course describes the most important ideas, theoretical results, and examples of logic, set theory, methods of proof, relations, functions and basics of algebraic structures limit. The course includes the essential fundamentals of these topics. The emphasis is on step by step reasoning and mathematical thinking.

B. Course Outcomes

At the end of this course the student will be able to:

- Be familiar with the rudiments of mathematical logic and set theory.
- Use the important concepts of relations, functions, and binary operations.
- Describe the group concept and some of its elementary properties.

C. References:

Required Textbook

- *Mathematical Proof: A transition,* C. Robers; Champan & Hall/CRC 2010.

- *A Primer for Logic and Proof,* H. P. Hirst and J. L. Hirst, webdraft, (2011-2012 Ed.), 2012.

Other references:

- *Mathematical Proofs: A transition to Advanced Math.,* G. Chatrand and others, Pearson, 3rd Edition, 2013.

- *Mathematical Thinking & Writing: A transition to Abstract Math,* R. Maddox, Academic Press 2002.

Course Website: Google Classroom Webpage: http://www.imamm.org/

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[1] *B.Sc. in Applied Mathematics.*

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D. Topics Outline

1. **Logic:** Statements, Negation, and Compound Statements, Truth Tables and Logical Equivalences, Conditional and Biconditional Statements, Open Statements and Quantifiers.

2. **Set Theory:** Sets and Subsets, Operations on Sets, Generalized Set Union and Intersection, Cartesian Product.

3. **Methods of Proofs:** Direct Proof Method, Contrapositive Proof Method, Proof by Contradiction, If and Only If Proof, Existence Proof and Counterexample Method, Mathematical Induction and its Strong Version.

4. **Relations:** Binary Relations, Reflexive, Symmetric, antisymmetric, and Transitive Relations, Equivalence Relations, Equivalence Classes, and Partitions, The Order Relations.

5. **Functions:** Functions, Onto Functions, One-to-One Functions, the Bijection Function, Inverse of a Function, Images and Inverse Images of Sets, Denumerable and Countable Sets, Uncountable Sets.

6. **Basics of Algebraic Structures:** Binary operations; Semigroups and Groups; Subgroups and Cyclic Groups; Rings, Integral Domains and Fields.

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	Midterm 2: 20 %	Final Exam: 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

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G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3