

# King Fahd University of Petroleum and Minerals

## Department of Mathematics & Statistics

### Syllabus MATH232

Semester I, 2010-2011 (101)

**Instructor:** Dr. Robert Heffernan [ Office: 7-133, Phone: 4377, E-mail: [heffernan@kfupm.edu.sa](mailto:heffernan@kfupm.edu.sa) ]

**Course:** Math 232 (Introduction to Sets and Structures)

**Textbooks:** *Introduction to Mathematical Structures and Proofs* by Larry J. Gerstein; and *Contemporary Abstract Algebra (6e)* by Joseph A. Gallian.

**Objectives:** This course is intended to introduce students to some fundamental concepts in mathematics and to familiarise them with mathematical proofs and rigour. The aim is to provide students with the appropriate background for more advanced courses in mathematics.

**Lectures:** Saturday/Monday/Wednesday ; Building 7, Room 100

**Grading:** 450 points total (Exam I: 100, Exam II: 100, Homework: 100, Final exam: 150)

Week	Date	§	Topic
1	25 Sep–29 Sep	1.1	Statements, propositions and theorems
		1.2	Logical connectives and truth tables
		1.3	Conditional statements
2	02 Oct–06 Oct	1.4	Proofs: structures and strategies
		1.5	Logical equivalence
3	09 Oct–13 Oct	2.1	Sets: fundamentals
		2.2	Russell's paradox
		2.3	Quantifiers
4	16 Oct–20 Oct	2.4	Set inclusion
		2.5	Union, intersection and complement
		2.6	Indexed sets
5	23 Oct–27 Oct	2.7	The power set
		2.8	Ordered pairs and Cartesian products
6	30 Oct–03 Nov	2.9	Partitions and relations
		2.10	Mathematical induction and recursion
<b>Major exam I: Date, time &amp; location TBA</b>			
7	06 Nov–10 Nov	3.1	Functions: definitions and examples
		3.2	Surjections, injections, bijections & sequences
		3.3	Composition of functions
<b>Id al-Adha vacation: Thursday November 11, 2010 – Sunday November 21, 2010</b>			
8	22 Nov–24 Nov	4.1	Cardinality
		4.2, 4.4	Finite & infinite sets
		4.3	Countable and uncountable sets
9	27 Nov–01 Dec	6.1	Operations
		6.2	The integers
		6.3	The fundamental theorem of arithmetic
10	04 Dec–08 Dec	6.4	Congruence
		6.5	Euler's function
		6.6	The inclusion-exclusion principle
<b>Major exam II: Date, time &amp; location TBA</b>			
<i>Chapter references in what follows are to Gallian's Abstract Algebra</i>			
11	11 Dec–15 Dec	Ch. 2	Groups: definitions & examples Elementary properties of groups
12	18 Dec–22 Dec	Ch. 3	Finite groups & subgroups
		Ch. 4	Cyclic groups
13	25 Dec–29 Dec	Ch. 5	Permutations & cycles Permutation groups
		Ch. 6	Isomorphisms & Cayley's theorem
15	08 Jan–12 Jan	Ch. 9	Cosets & Lagrange's theorem
			Review
<b>Final exam (comprehensive): Tuesday January 25, 2011 (7.00pm)</b>			