

King Fahd University of Petroleum and Minerals

Department of Mathematics & Statistics

Syllabus MATH232

Semester I, 2011-2012 (111)

Instructor: Dr. Robert Heffernan [Office: 5-203-6, Phone: 4377, E-mail: 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 8.00–8.50 ; Building 7, Room 100

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

Week	Date	§	Topic
1	10 Sep–14 Sep	1.1	Statements, propositions and theorems
		1.2	Logical connectives and truth tables
		1.3	Conditional statements
2	17 Sep–21 Sep	1.4	Proofs: structures and strategies
		1.5	Logical equivalence
3	24 Sep–28 Sep	2.1	Sets: fundamentals
		2.2	Russell's paradox
		2.3	Quantifiers
4	01 Oct–05 Oct	2.4	Set inclusion
		2.5	Union, intersection and complement
		2.6	Indexed sets
5	08 Oct–12 Oct	2.7	The power set
		2.8	Ordered pairs and Cartesian products
6	15 Oct–19 Oct	2.9	Partitions and relations
		2.10	Mathematical induction and recursion
Major exam I: Date, time & location TBA			
7	22 Oct–26 Oct	3.1	Functions: definitions and examples
		3.2	Surjections, injections, bijections & sequences
		3.3	Composition of functions
8	29 Oct & 31 Oct	4.1	Cardinality
		4.2, 4.4	Finite & infinite sets
		4.3	Countable and uncountable sets
Id al-Adha vacation: Monday 01 November, 2011 – Friday 11 November, 2011			
9	12 Nov–16 Dec	6.1	Operations
		6.2	The integers
		6.3	The fundamental theorem of arithmetic
10	19 Nov–23 Nov	6.4	Congruence
		6.5	Euler's function
		6.6	The inclusion-exclusion principle
Major exam II: Date, time & location TBA			
<i>Chapter references in what follows are to Gallian's Abstract Algebra</i>			
11	26 Nov–30 Nov	Ch. 2	Groups: definitions & examples Elementary properties of groups
12	03 Dec–07 Dec	Ch. 3	Finite groups & subgroups
		Ch. 4	Cyclic groups
13	10 Dec–14 Dec	Ch. 5	Permutations & cycles Permutation groups
14	17 Dec–21 Dec	Ch. 6	Isomorphisms & Cayley's theorem
15	24 Dec–28 Dec	Ch. 9	Cosets & Lagrange's theorem
16	31 Dec & 02 Jan		Review
Final exam (comprehensive): Sunday 15 January, 2012 (7.30am)			