King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
Math 455 Syllabus
Second Semester 2012-13 (122)

Title: Number Theory

Credit: 3-0-3

Textbook: An Introduction to the Theory of Numbers, by Niven, Zuckerman, and Montgomery, 5th edition, 1991, Wiley & Sons.

Description: Divisibility and primes. Congruences. Primitive roots. Quadratic reciprocity. Arithmetic functions. Diophantine equations. Applications (e.g. cryptography or rational approximation).

Objective: The aim of this course is to introduce students to the fundamental concepts and results of Number Theory. The first three parts deal with divisibility and primes, congruences, and quadratic reciprocity. Arithmetic functions and related notions are included in Part 4. Diophantine equations are covered in Part 5. The last part of the course is devoted to Irrational Numbers, Public-Key cryptography, and Pseudoprimes.

Prerequisite: Math 232 or Senior standing.

Weeks	Topics	Homework
2	Divisibility	3 (b,e), 10, 13, 16, 25, 27
	Primes	4, 5, 11, 12, 14, 19, 22 (1,4,10,15), 24
2	Congruences	3, 5, 11, 20, 29, 33, 39
	Solutions of congruences	1, 3, 4, 5(g), 6(b)
2	Chinese Remainder Theorem	1, 2, 3, 10, 11, 19, 26, 27, 29, 35, 36
	Prime modulus	1(b,c), 3, 4, 5
	Primitive roots and power residues	1, 3, 4, 7, 8(b,d), 12, 18, 19
2	Quadratic residues	2, 3, 5, 7(c,f), 8(c,f), 9, 10, 13
	Quadratic Reciprocity Law	1, 4(a,f), 6, 9, 11, 14
2	Greatest integer function	1, 2, 3(a,e), 6, 7, 16
	Arithmetic functions	2, 5, 6, 8, 13, 16, 18
	Mobius Inversion Formula	3, 6, 7, 8
3	The equation ax+by=c	2, 9, 11, 12
	Pythagorean triangles	1, 2, 3, 7, 9, 10
	Assorted examples of Diophantine equations	1, 2, 5, 10
2	Irrational numbers	3, 7, 8, 10
	Public-Key cryptography	Hand-out
	Pseudoprimes	Hand-out