

**King Fahd University of Petroleum & Minerals**  
**Department of Mathematics & Statistics**  
**MATH 427 Syllabus**  
**Second Semester 2021-22 (212)**

**Title:** Number Theory

**Credit:** 3-0-3

**Textbook:** An Introduction to the Theory of Numbers, by Niven, Zuckerman, and Montgomery, 5<sup>th</sup> 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 210 or senior standing.

Weeks	Topics
2	1.2 Divisibility 1.3 Primes
2	2.1 Congruences 2.2 Solutions of congruences
2	2.3 Chinese Remainder Theorem 2.7 Prime modulus 2.8 Primitive roots and power residues
2	3.1 Quadratic residues 3.2 Quadratic Reciprocity Law
2	4.1 Greatest integer function 4.2 Arithmetic functions 4.3 Mobius Inversion Formula
3	5.1 The equation $ax + by = c$ 5.3 Pythagorean triangles 5.4 Assorted examples of Diophantine equations
2	6.3 Irrational numbers Public-Key cryptography and Pseudoprimes ( <i>Handouts</i> )

**Grading Policy**

- Exam 1: 22% (February 28, 2022 on 1.2–2.3)
- Exam 2: 22% (March 28, 2022 on 2.7–4.1)
- HW/Quizzes: 20%
- Final Exam: 36% (comprehensive)

**Attendance:** KFUPM attendance policy will be applied in this course.