

MATH 101 : COMBINATORICS

California State University, Sacramento · Department of Mathematics & Statistics

CATALOG DESCRIPTION

Theory of divisibility; some number theoretical functions; congruencies (linear and quadratic); some Diophantine equations. Simple continued fractions. **Graded:** Graded Student. **Units:** 3.0.

PREREQUISITES

Math 31

ASSIGNMENTS

A variety of reading and problem solving assignments will be part of the course.

EXAMINATIONS

There will be regular midterm examinations and a comprehensive final examination for this course.

COURSE OUTLINE

- I. Elementary properties of divisibility and primes
 - A. The Euclidean algorithm
 - B. The Fundamental theorem of arithmetic
 - C. Applications
 - D. Multiplication and completely multiplicative arithmetic
 - E. Functions
 - F. Linear Diophantine equations
- II. Divisors of an Integer
 - A. Number of divisors of an integer
 - B. Sum of the divisors of an integer
- III. Fundamental Properties of Congruences
 - A. Linear congruence equations including Chinese remainder theorem
 - B. Reduced residue systems and Euler's ϕ -function
 - C. Fermat's theorem
 - D. Polynomial congruences
 - E. Primitive roots
- IV. Diophantine Equations
 - A. The Use of congruences in solving Diophantine equations

- B. Pythagorean triples
- C. Fermat's method of descent

V. Numbers, Rational & Irrational

- A. Period of rational numbers
- B. Purely periodic rational numbers

VI. Other topics if time allows:

- A. Quadratic reciprocity
- B. Simple continued fractions
- C. Perfect numbers
- D. Mersenne primes

Sample