Marshall University
College of Science
Mathematics Department

MTH 455: Number Theory

Course catalog description
A survey of some basic properties of the integers: divisibility (prime numbers, factorization, perfect numbers), congruences (modular arithmetic, linear and quadratic congruences, the Chinese Remainder Theorem), and Diophantine equations.

Credit hours
3 hours

Prerequisites
A grade of C or higher in MTH 300

List of topics

Divisibility

- Divisors
- Well-ordering property.
- G.C.D.s and L.C.M.s
- Euclidean Algorithm (standard and extended™)
- Prime numbers
- Prime Factorization
- Number-Theoretic Functions (Phi, number of divisors, sum of divisors)

Congruences

- Definitions and basic properties
- Linear congruences: existence and finding solutions
- Systems of congruences (Chinese Remainder Theorem)
- Wilson and Fermat’s (little) Theorems
• Quadratic Congruences: Euler’s criterion, Quadratic Reciprocity
• Order of elements (mod n): primitive roots and indices

Diophantine Equations
• Linear Diophantine equations: existence and production of
• Solutions
• Pythagorean Triples
• Fermat’s Last Theorem (for n=4)
• The Two-square and Four-square Theorems
• Pell’s Equation

Learner Outcomes

1. Students will learn a sound understanding of the fundamental concepts of number theory, a knowledge of its applications, and an appreciation of its history and links with other branches of mathematics.
2. Students will develop facility in using calculators and computers to solve mathematics problems.

Suggested textbooks


Last updated
December 2016