

Department: MATHEMATICAL SCIENCES

Semester Hours: 3

Course Title and Number: MATH 303 - Introduction To Number Theory

Course Description: Problem solving, methods of proof, divisibility, primes, congruences, Diophantine equations, integer sequences, number-theoretic functions, and selected topics. Not used in major or minor GPA calculation for mathematical sciences majors or minors.

PRQ: MATH 229 or consent of department.

Course Objectives:

- To value mathematics and develop an ability to communicate mathematics, both in writing and orally.
- To develop an appreciation of necessity of formal proofs, and their construction.
- To understand and connect concepts, algorithms and applications found in the elementary and middle school curricula.
- To understand more fully the structure of the set of integers, and its properties.

Content:

- Introduction to number theory: well ordering principle; induction; Pascal's triangle; the binomial theorem.
- Divisibility: greatest common divisors; least common multiples.
- Prime and composite numbers: fundamental theorem of arithmetic; irrationality; infinitude of primes.
- Congruences: Fermat's Little Theorem; Wilson's Theorem.
- Other topics: linear Diophantine equations; the Chinese remainder theorem; special sequences of integers; number patterns; number theoretic functions.

Course Requirements: Discussion of the elements of proof and their construction. Discussion of the development of algorithms and communicating their use. Solution of elementary problems involving the set of integers and their properties. Homework collected and graded. Quizzes. Comprehensive final examination. Reading and writing on number theory.

Assessment Instruments: Judgment on student involvement and depth of contribution to in class discussions. Homework assignments. Quizzes. Hour examinations and the final examination.

Selective Bibliography:

- LeVeque, **Elementary Theory of Numbers**, Dover (1990).
- Ore, **An Invitation to Number Theory**, MAA (1967).
- Ore, **Number Theory and its History**, Dover (1988).
- Silverman, **A Friendly Introduction to Number Theory**, Prentice-Hall (1997).