Math 284 Course Content and Objectives

COURSE CONTENT AND SCOPE - **Lecture:** Outline the topics included in the lecture portion of the course *(Outline reflects course description, all topics covered in class).*	Hours Per Topic	COURSE OBJECTIVES - **Lecture:** Upon successful completion of this course, the student will be able to...*(Use action verbs - see Bloom's Taxonomy for 'action verbs requiring cognitive outcomes.')*
Integers: Primes, perfect numbers, divisibility, and Mersenne primes.	6	Apply the definition of divisibility. Demonstrate the relationship between Mersenne primes and even perfect numbers.
Prime factorizations: Greatest common divisors, the Euclidean algorithm, Diophantine equations, and the Fundamental Theorem of Arithmetic.	6	Calculate the greatest common divisor using the Euclidean algorithm. Apply the Fundamental Theorem of Arithmetic to decompose composite numbers. Apply the Fundamental Theorem of Arithmetic to calculate the least common multiple. Solve Diophantine equations using the Euclidean algorithm.
Congruences: Congruence classes, linear congruences, the Chinese Remainder Theorem, systems of linear congruences, Wilson's Theorem, and Fermat's Little Theorem.	10	Perform calculations with congruence classes. Solve systems of linear congruences. Develop tests for divisibility using congruences.
Applications of congruences: Divisibility tests and cryptography.	6	Use congruences to cipher and decipher crypto-systems.
Multiplicative functions: The Euler phi function, the sum of divisor functions, and the number of divisor functions.	6	Perform calculations with the Euler phi function and with the sum of divisors, and number of divisors functions.
Primitive roots: The group of units, existence of primitive roots, application of primitive roots, and the universal exponent.	6	Determine the order of an integer.
Quadratic residues: Residues, non-residues, Euler's criteria, Gauss's Lemma, the Jacobi symbol, and the Law of Quadratic Reciprocity.	6	Determine the quadratic residues and non-residues of an integer using the Law of Quadratic Reciprocity, Euler's criteria and Gauss's Lemma, and properties of the Jacobi symbol.
Continued fractions: Rational and irrational numbers and finite, infinite, and periodic continued fractions.	6	Express rational and irrational numbers as continued fractions using the Euclidean algorithm.
Final examination.	2	Final examination.
Total: Total Lecture Hours In Section I Class Hours:	54 54	