

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
SYLLABUS (Tentative)
MATH 402/512 Theory of Numbers

OBJECTIVES: To study some of the fundamental topics of classical number theory while developing techniques of proof associated with this discipline.

PREREQUISITE: MATH 210 and/or MATH 306 (both recommended).

TEXT: “Elementary Number Theory,” by David M. Burton; McGraw-Hill Publishing Company, 7th Edition, 2011.

	<i>Weeks</i>
<i>Preliminaries</i>	1.0
Mathematical induction; Binomial Theorem; early number theory	
<i>Divisibility Theory in the Integers</i>	1.5
Division algorithm; greatest common divisor; Euclidean Algorithm; Diophantine Equations	
<i>Primes and Their Distribution</i>	1.0
Fundamental Theorem of Arithmetic; Sieve of Eratosthenes; Goldbach Conjecture	
<i>Theory of Congruences</i>	1.0
Basic properties of congruence; binary and decimal representations; divisibility tests; linear congruences; the Chinese Remainder Theorem	
<i>Fermat’s Theorem</i>	1.5
Fermat’s Little Theorem; pseudoprimes; Wilson’s Theorem; Fermat-Kraitchik Factorization Method	
<i>Number-Theoretic Functions</i>	1.0
The functions σ and τ ; Möbius Inversion Formula; greatest integer function	
<i>Euler’s Generalization of Fermat’s Theorem</i>	1.0
Euler’s phi-function; Euler’s Theorem; Properties of Euler’s phi-function	
<i>Primitive Roots and Indices</i>	1.0
The order of an integer modulo n ; primitive roots; theory of indices	
<i>The Law of Quadratic Reciprocity</i>	2.0
Quadratic Congruences; The Legendre Symbol; Quadratic Reciprocity	
<i>Additional Topics (as time permits)</i>	2.0
Possible topics include: cryptography; perfect and amicable numbers; Fermat numbers; Fermat’s Last Theorem; Sums of Squares; Fibonacci Numbers; Continued Fractions	
<i>Tests</i>	1.0

EVALUATION

Group Project	5-15%
Homework	15-25%
Boardwork and Participation	15-25%
Midterm Exam	20-30%
Final Exam	25-35%

Graduate students will be assigned special or additional homework/test problems or projects.

NOTE: ONCE A STUDENT HAS RECEIVED CREDIT, INCLUDING TRANSFER CREDIT, FOR A COURSE, CREDIT MAY NOT BE RECEIVED FOR ANY COURSE WITH MATERIAL THAT IS EQUIVALENT TO IT OR IS A PREREQUISITE FOR IT.

KEL

1/2018