

**MATH 506 – 17070**  
**Introduction to Number Theory**

SPRING 2008

MON, WED, FRI, CW144, 9:30–10:20

HOME-PAGE: <http://www.math.ksu.edu/~pinner/math506>

**Instructor:** Prof. Chris Pinner

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**Office Hours:** MWF 10:30–11:30, or by appt.

**Text:** *Elementary Number Theory*, Charles vanden Eynden, 2nd edition, Waveland Press, ISBN 1-57766-445-0 (McGraw-Hill ISBN 0-07232-571-2).

**Prerequisites:** MATH 220 & 221 recommended but all that is required is a sound knowledge of College Algebra and some mathematical maturity.

### Course Outline

Number theory is essentially the study of the natural numbers  $1, 2, 3, \dots$  and their properties. It is one of the oldest branches of mathematics but continues to be an active area of research. For example a major modern day application is cryptography (the National Security Agency is the largest employer of Number Theorists in the country). Its problems, often simple to state, have in many cases remained unsolved for centuries.

We should cover much of Vanden Eynden. In particular proof by induction, divisibility, primes, uniqueness of factorization, congruences, Chinese Remainder Theorem, Cryptography, Pythagorean triples (eg  $3^2 + 4^2 = 5^2$ ) and other Diophantine equations, Perfect Numbers (eg  $6 = 1 + 2 + 3$  is the sum of its proper divisors), rational versus irrational, arithmetic functions, rational approximation & continued fractions (eg  $\pi$  is close to  $22/7$ ,  $355/113$  is better; how do we obtain approximations like these?), quadratic congruences & quadratic reciprocity. We may occasionally include material outside of the text.

### Grading Scheme

Weekly assignments worth 200 points,

Three mid-terms worth 100 points each.

Tentative dates: Wed Feb 13, Wed March 12, Wed April 16.

Final Exam worth 200 points, Fri May 16, 11:50-1:40pm.

**Assignments:** Homework will be assigned in class (due in the homework box by 5pm on the Friday of the following week). You will generally have about a week to complete the assignment. Don't leave your homework to the last minute (many of the questions will involve proofs or may require extended thought). Show all your work. Include your name and Math 506 on the front. The lowest homework score will be dropped.

**General Information:** If you have any condition such as a physical or learning disability, which will make it difficult to carry out the work as I have outlined it or which will require academic accommodations, please notify me in the first two weeks of class. There will be no late homework or make-up exams. If you have to miss a test for a valid reason then your course grade will be determined from your remaining work (notify me as soon as possible).

**Some Useful Dates:**

Jan 21 - MLK Holiday

Feb 6 - Last day for 100% refund

Feb 13 - Last day for 50% refund

Feb 21 - Last day to drop without a W

Mar 17-21 - Spring Break

Mar 24 - Last day to drop with a W

May 9 - Last Day of Class.