Course Overview

Number theory concerns the natural numbers and their properties. In this class we will collectively work through a series of problems designed to teach us the basic results in this area. The class is designated as Oral Intensive. For us, this means for that you (collectively) will be presenting the course material. The course has two primary goals: you will learn some number theory, and you will also learn about teaching yourself and communicating mathematics.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	ffdam@uaf.edu
Phone	474-1196
Web	http://www.math.uaf.edu/~maxwell
Course Text	**A Pathway into Number Theory**, *R.P. Burn*, Cambridge University Press

Optional Texts

Another good text, that almost became our course text, is

- **Elementary Number Theory**, *Gareth A. Jones and J. Mary Jones*.

Prerequisites

A grade of C or better in Math 401 or Math 308.

Class Time

We are scheduled to meet from 4:40-5:40 on Wednesdays in Chapman 107. Given the large number of students in the seminar, we try to arrange to meet for a little longer than one hour.

Class time will be spent in a series of two to three oral presentations from students presenting material from the text. After each presentation there will be a question period where we will discuss questions we have about the presentation or that came up in working through the problems for that section.

Office Hours

I will schedule 3 hours a week of formal office hours. These times will be chosen after consulting with my classes. I will post the times on my website and outside my office door. I have an open door policy; if I'm in my office and my door is open, please feel free to drop by with questions. You are also welcome to schedule a meeting outside of my formal office hours by sending me an email.

Presentations

The course text is unusual. It is just a series of problems to be worked out that guide you through much of the foundation of number theory. For your presentation, you will be assigned a block of questions to present. Your job is to digest the material covered in the questions and then present it in a short presentation. The idea is to explain the material to the class. You will be graded on correctness and clairity.

In your talk you will want to clearly and explicitly state the definitions and theorems from your set of problems. In your presentation you can give examples that illumnate the theorems, prove theorems, give precise sketches of theorems, give historical background, and so forth. But you don't want to simply run through the list of problems – we will all have done this!

Homework

Each week a block of problems will be assigned. These problems will be the basis of the talks for the next week. While the presenters for the following week are preparing their lectures, you will be working through the problems on your own. On the day of the lectures, you will hand in your problems. Your job is to answer most of the questions and neatly write down your answers in a readable form. For questions you are unable to answer, it would be a good idea to write down what your questions are for that problem (and to ask them during the class's question period). I will grade the homework largely on a basis of completion; I want to see that you are making an honest attempt to work through the material and that you are thinking critically about it.

Midterms

The midterm for this class is the ETS Major Fields Test in Mathematics. Your grade on this exam is based only on your active participation, not your test score. We will hold it at a time and day to be announced later in the semester.

Final Exam

There will be a two-hour final exam on Wednesday May 10 at 5:45pm. The exam will be comprehensive.

Evaluation

Course grades will be determined as follows:

Presentations	55%
Fields Test	10%
Homework	15%
Final	20%

Letter grades will be assigned according to the following scale. This scale is a guarantee; I also reserve the right to lower these thresholds.

A	90–100%
B	80–89%
C	70–79%
D	60–69%
F	0–59%

Tentative Schedule

Day	Topics and Events
1/25	Euclidean Algorithm
2/1	Prime Factorization, Chinese Remainder Theorem
	Friday: Last drop day (50% refund)
2/8	Euler ϕ function, Fermat's Theorem, Wilson's Theorem
2/15	Linear Congruences, Fermat-Euler Theorem, Lagrange's Theorem, Chevalley's Theorem
2/22	Quadratic Residues
3/1	Equations of the form $x^n + y^n = z^n$.
3/8	More equations of the form $x^n + y^n = z^n$, Sums of Squares
3/15	Spring Break
3/22	More sums of squares, start quadratic forms
3/29	Quadratic forms
4/5	Geometry of numbers
4/12	Geometry of numbers
4/19	Continued fractions
4/26	Continued fractions
5/3	Aprroximations of irrationals
5/10	Final Exam 5:45pm

Rules and Policies

Collaboration You are encouraged to work together going through the homework problems. But you must write up your notes independently.

Makeup Exams You can make up the final exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss it exam.

Attendance Attendence is mandatory. Two unexcused absences will lower your grade by a letter grade. Extend linearly.

Cell Phones Turn off your cell phone before you come to class.

Disabilities Services I will work with the Office of Disabilities Services (203 Whitaker, 474-7043) to provide reasonable accommodation to students with disabilities.

Incomplete Grade Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.