Math 351 – Number Theory – Course Policies

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Office Hours:	Posted on webpage **And by appointment** (Really!)
Text:	*Number Theory, A Lively Introduction* by Pommersheim, Marks, and Flapan

Overview

Number Theory is simply the study of the integers, but as you may suspect from your previous experience with mathematics, there is much more to the story than initially meets the eye. Number Theory has a rich tradition that is very deep, exceedingly beautiful, and many of the topics are also very accessible and open to exploration. Much of the semester will be devoted to questions of divisibility and properties of prime numbers. However, we will also see applications to encryption algorithms, some beautiful results on continued fractions, and the proof of Fermat's Last Theorem for the case $n = 4$.

This course is designed to continue your development from being a *consumer* of mathematics to being a *producer* of mathematics. This experience can be simultaneously sloppy, exhilarating, frustrating, but ultimately incredibly rewarding. A large part of this process is becoming comfortable with not always knowing exactly what may be effective, but still being willing to try. If that direction doesn't work, then that's ok! Try something else! I recently heard a saying that I think describes the study of mathematics quite well:

"It's ok to make mistakes, as long as they're new ones."

The structure of the course may be somewhat different from the other math courses you have had in that there will be very little lecture, but instead the students will be actively involved in presenting their solutions during every class meeting. Everyone in the class is expected to engage with the content before class by reading the text, to present daily homework assignments at the board during class, and to contribute during class to the discussions about the presentations. In addition to learning the specific Number Theory content of the course, one of the explicit goals of the course is to help you develop your mathematical creativity.

I am very excited about this semester – I think think we're all going to learn a tremendous amount, and it's going to be a lot of fun.

Evaluation

Your final grade will be determined by

Pre-class Reading Assignments and Glossary	10%
Daily Homework	15%
In-class Presentations and Participation	25%
Weekly Homework and Portfolio	15%
Exams	35%

Pre-class Reading Assignments and Glossary

Your overall understanding and experience in the course will benefit greatly by reading the text and reflecting on the major aspects before you begin the Daily Homework assignments. To encourage your reading, you will have a Pre-Class Reading Assignment for every class meeting. In addition, one of the challenges in any upper level mathematics course is keeping track of the terminology and the theorems over the course of the semester. To help with this endeavor, the class will build an online Glossary in onCourse.

The logistics of building the Glossary and the Reading Assignments are fairly straight-forward.

- For each day of class, one student will be assigned the task of entering the information into the Glossary in onCourse that contains the definitions, propositions, and theorems in the assigned reading. We can display these during the class meetings, and the Glossary will also be a useful reference for you throughout the semester.
- The other students will also read the assigned section(s) of the text and answer the following three questions in onCourse:
  1. In your own words, explain the major ideas from the reading.
  2. What was surprising or unexpected in the reading? Why?
  3. Which aspects were unclear to you, or what questions do you have?

The Reading Assignments and Glossary are to be completed by 6:00 pm on the day *before* class. The detailed assignments are posted on the course webpage, and these will be graded on a +/✓/– scale.

Daily Homework

For every class meeting, you will have a set of Daily Homework problems from the text to complete. The problems will be designated as either Type I or Type II problems. Type I problems will be fairly straightforward or primarily computational in nature, while Type II problems are more difficult and require more careful explanation. You should carefully write out your solutions and proofs for the Daily Homework since these form the basis for the In-class Presentations, Weekly Homework, and the Exams.

I encourage you to work with others on the Daily Homework, but you must write up your solutions on your own. You must indicate on every problem the student(s) with whom you worked or if you worked alone.

I expect you will take notes and modify your Daily Homework based on the In-class Presentations, but these notes must be clearly differentiated from the work you bring into class. I will collect the Daily Homework at the end of the class meeting, and these will be graded on a +/✓/– scale.

In-class Presentations and Participation

The vast majority of the class meetings will be devoted to the class presenting problems selected from the Daily Homework. I will usually ask for volunteers to present, but I may also call on students to help ensure that everyone is participating.

Here are some good guidelines to follow in your presentations (Thanks to Carol Schumacher at Kenyon College for these):

- You must have written out the proof in detail and understand the major ideas and transitions so that you can make clear the path of the proof to the other students.
- The purpose of class presentation is not to prove to me that you have done the problem. It is to make the ideas of the proof clear to the other students.
- You should write in complete sentences, using proper English and mathematical grammar.

- You should explain your reasoning as you go along, not simply write everything down on the board and then turn to explain.
- Fellow students are allowed to ask questions at any point, and it is your responsibility as the presenter to answer those questions to the best of your ability.
- Since the presentation is directed at the students, you should frequently make eye-contact with the other students in order to address questions when they arise and also be able to see how well they are following your presentation.

Your presentations will be graded using the following rubric

Grade	Criteria
4	Completely correct and clear proof or solution.
3	Proof has minor technical flaws, some unclear language, or lacking some details. Essentially correct.
2	A partial explanation or proof is provided but a significant gap still exists to reach a full solution or proof.
1	Minimal progress has been made that includes relevant information and could lead to a proof or solution.
0	You were completely unprepared.

However, you should not let the rubric deter you from presenting if you have an idea about a proof that you would like to present, but you are worried that your proof is incomplete or you are not confident your proof is correct. You will be rewarded for taking a chance and presenting your creative ideas! Yet, you should not come to the board to present unless you have spent time thinking about the problem and have something meaningful to contribute. After a student has presented a solution that the class agrees is sufficient, I will often call upon another student in the class to come to the board to recap what happened in the proof and to emphasize the salient points.

(Thanks to Dana Ernst at Northern Arizona for the rubric and class structure around the presentations.)

Weekly Homework and Portfolio

The Weekly Homework is due on Fridays at 2:00 and will consist of two or three substantial problems, often coming from the Daily Homework. These should be precise, comprehensible, thoroughly justified, and written in complete sentences. As with the Daily Homework, I encourage you to work with others on the Daily Homework, but you must write up your solutions on your own. You must indicate on every problem the student(s) with whom you worked or if you worked alone.

You will use the technical typesetting program LaTeX to prepare your Weekly Homework and upload your assignment to onCourse. LaTeX is the standard for mathematical typesetting and has the tremendous advantage of being available on nearly every computing platform. In addition, you can easily edit LaTeX files later. At the end of the semester, you will create a Portfolio of 10 problems from the Weekly Homework that you have revised and corrected. There is much more information about using LaTeX on the course webpage, including a template you can use for your homework.

Each problem in the Weekly Homework will be graded using the same rubric as the In-class Presentations.

Exams

There will be two exams given during the semester and a Final Exam during exam week. The Exams are closed book and based *exclusively* on the Daily and Weekly Homework assignments. Therefore, it is in your best interest to ensure that you completely understand all of the assigned problems and In-class Presentations.

See the course webpage for the dates of the Exams.

The Honor Code

We operate under the Wheaton Honor Code for all of your academic work at Wheaton. This carries certain freedoms and responsibilities for both you as a student and me as a professor. I take this quite seriously.

As part of your first Reading Assignment due Thursday, August 29 at 6:00 pm, you should read and understand the Wheaton Honor Code at *http://wheatoncollege.edu/about/honor-code/* including all of the subsections: *Community Standards, Affirming Diversity, Plagiarism, Technology Acceptable Use, Conduct Off Campus,* and *Judicial Procedures.*

Most likely, no Honor Code issues will arise this semester. If you are uncertain about whether a particular situation falls under the Honor Code, then please consult with me. However, if an Honor Code issue does come up, I will assume that you are prepared for the full consequences after having acknowledged that you have read and understood the policies and procedures.

Remember that you should write out, and sign, the following statement on all course work:

> "I have abided by the Wheaton College Honor Code in this work."

Class Attendance and Late Homework Policy

Although class attendance is not a specified percentage of your grade, you obviously must attend to turn in your Daily Homework and participate in the In-class Presentations and discussions. You are responsible for any content of a class you missed. I will keep a class roll to help me determine borderline grades at the end of the semester.

I am very strict about the deadline for homework, and I will not accept any homework after this time with one exception: I will allow you to turn in up to *three* homework assignments (Daily or Weekly) late during the semester. You do not need to give me any justification, but you must inform me in writing (email is preferred) before the homework is due that you intend to take advantage this policy. This late assignment is due at the beginning of the next class period.

Getting Help

Please come see me during my office hours! If you have a conflict and cannot make my office hours, please call or email me and we can set up an appointment for another time.