Math 317 - Number Theory
Course Information

Instructor and Course Meeting Information

Instructor: Lola Thompson
E-mail: lola.thompson@oberlin.edu
TuTh 11 AM - 12:15 PM
Location: King 237
Office: King 200
Office Hours:
   Tu 1:30 - 2:30
   W 11 - 12
   Th 4:30 - 5:30
   *And by appointment.

Course Objectives

By the end of this course, you will be able to:

- Build up the basic theory of the integers from a list of axioms
- Write clear, precise mathematical proofs
- Improve your written and oral communication skills
- Apply your theoretical knowledge to problems in computer security
- Explore some current research problems in number theory

Course Structure

This course will be taught using an Inquiry-Based Learning (IBL) model. The format will be very different from that of a typical math course. In particular, there will be very few lectures and no assigned reading. A typical class period in Math 317 will consist of working on problems in small groups or presenting solutions at the blackboard in front of your classmates. Rather than being presented with neatly-packaged theorems and proofs, in this course you will be asked to devise your own conjectures and then prove them for yourself!

Textbook

There is no textbook for this course! Students will write their own number theory textbooks over the course of the semester... (for more info, see the "Textbook Project" section)

Grades

The grades in this course will be calculated as follows:

	Weight
Class Participation	20%
Homework	25%
Quiz #1	10%
Quiz #2	15%
Textbook Chapter 1	5%
Textbook Project	25%

Class participation

Class participation is essential in a course of this nature. When you miss class, you are not only affecting your own progress in the course but you are also causing your working group to be short one member. Your class participation grade (worth 20% of your course grade) will be calculated using the following formula:

- Group work (10 points)
- Student presentations (10 points)

Attendance: Each student is granted three "unexcused" absences. After that, absences will adversely affect your Class Participation grade. There is no need to e-mail me to explain an unexcused absence. If you have a legitimate academic reason for missing a class (or a documented illness), please e-mail me as soon as possible. All "excused" absences must be cleared with me before the start of the missed class period.

Group work: Working groups will be assigned. They will normally consist of 3-4 students. Groups will be shuffled (approximately) every two weeks. If you are having a serious problem with someone in your group, please contact me ASAP. Your Group Work grade will be calculated using a peer-assessment survey and a self-assessment survey, which will be handed out at the end of the semester.

Student presentations: Each student is expected to regularly present solutions to the problem sets in front of the class. That said, I will always ask for volunteers before calling on students. The "student presentation" grade is intended to provide an incentive to volunteer regularly. The grade will be based solely on how often a student volunteers and not on the correctness of the solutions.

Homework Assignments

Students will work on problem sets in small groups. Problem sets will be due 1 week after they are handed out in class. Each group must turn in *one* copy of their homework for me to grade. You are welcome to add details to your solutions based on what you learn from your classmates' presentations (this will help with the end-of-semester final project). However, I will only grade the work that was completed prior to the class period.

Groups are strongly encouraged to use ShareLaTeX in order to write up the homework. This has the advantage of allowing students to collaborate on the write-up in real time. It also will make your textbook project MUCH easier to complete.

Quizzes

There will be two in-class quizzes. These will test your ability to solve routine problems and write some basic proofs. You will have the opportunity to solve any missed problems outside of class (for reduced credit).

Textbook Project

At the end of the semester, every student will author their own textbook. This will involve revising all of your work from over the course of the semester, organizing it into chapters, and inserting appropriate exposition to explain the flow of ideas. Points will be awarded based on a number of criteria, including: mathematical completeness/correctness, clarity of explanations, quality of exposition, organization of content. The first chapter of the textbook will be due on April 14th. You will receive feedback (from the instructor as well as your peers) on the first chapter. The full textbook will be due on May 11th. It is STRONGLY recommended that you set aside time each week to revise your work, rather than waiting until these deadlines.

Guest Lectures

I have arranged for several guest lectures on topics related to our course. These visitors are accomplished mathematicians who are donating their time to share their knowledge with you. It is my expectation that you will choose to attend all of the guests' talks (except in cases where the talk directly conflicts with your other academic obligations). I will make sure to announce all guest lectures at least one week in advance. Please make these talks a priority – they provide a unique opportunity to supplement our course with research-level mathematics!

Blackboard

Copies of the problem sets can be found on the course Blackboard site. Go to
`http://blackboard.oberlin.edu` to access these materials.

Share LaTeX

Beginning in the second week of classes, all students will be required to type up their homework using Share LaTeX. I will offer a LaTeX tutorial early in the second week to help you get up to speed. You can find Share LaTeX at `https://www.sharelatex.com`

Bobby's Office Hours

We are very fortunate to have an OWLS Leader for this course! Our OWL, Bobby Dorward, will hold office hours on Mondays & Wednesdays from 7 - 8 PM in Science Center N375.

Course Policies

Academic Honesty

Homework

Each week, your homework assignment will be to finish and carefully write up solutions to the in-class problem sets. You are welcome to consult with your class notes, your classmates and the instructor. However, you *may not* consult any textbooks or internet resources – otherwise, you run the risk of ruining the surprise of discovering the course content for yourself. Your experience in Math 317 will be much richer (and your intuition for the subject far greater) if you arrive at the solutions without the aid of a book.

You are encouraged to work with your group members outside of class. You are also welcome to form study groups with other students in the course. In any collaborative efforts (outside of working with your group members), you must abide by the following guideline: you may discuss the general problem-solving techniques for homework problems with other students, but you must write up your solutions independently.

Quizzes

You are not allowed to use any electronic device or consult any source other than the instructor during the quizzes. In particular, this means *no calculators, smartphones, regular cellphones, iPods, eReaders, laptops, notes, textbooks, etc.*

Note: Information about the Honor Code at Oberlin can be found at the following website: http://www.oberlin.edu/students/links-life/honorcode.html. Please familiarize yourself with its content. All students are responsible for maintaining the highest standards of honesty and integrity in every phase of their academic careers. The penalties for academic dishonesty can be severe and ignorance is not an acceptable defense.

Disabilities

Students in this course with disabilities, including "invisible" disabilities such as chronic diseases and learning disabilities, and who may need disability-related classroom accommodations, are encouraged to make an appointment to see their instructor as soon as possible.

Make-up Policy

Typically, I will not accept late homework, and a missed midterm exam cannot be made up. That said, I understand that some circumstances are beyond your control. Should you contract a serious illness or find yourself in an emergency situation, please contact me *immediately*. I will be happy to make arrangements with you under these types of extreme circumstances.

Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the semester to discuss appropriate accommodations.

Important Dates

Add/Drop Deadline	February 10th (Wednesday)
Spring Break!	March 19th (Saturday) - March 27th (Sunday)
Withdraw and P/NP Deadline	April 4th (Monday)
Classes End	May 6th (Friday)
Reading Period	May 7th (Saturday) - May 10th (Tuesday)
Textbook Project Due	May 11th (Wednesday) at 4 PM

Course Schedule

The following is an estimated schedule for the course. Please note that the quiz dates are tentative.

Lectures	Brief Description
2/2	Problem Set #1
2/4	Problem Set #2
2/9	Problem Set #3
2/11	Problem Set #4
2/16	Problem Set #5
2/18	Problem Set #6
2/23	Problem Set #7
2/25	Problem Set #8
3/1	Problem Set #9; **Quiz #1**
3/3	Problem Set #10
3/8	Problem Set #11
3/10	Problem Set #12
3/15	Problem Set #13
3/17	No Class
3/19 - 3/27	No Class – Spring Break!
3/29	Problem Set #14
3/31	Problem Set #15
4/5	Problem Set #16
4/7	Problem Set #17; **Quiz #2**
4/12	Problem Set #18
4/14	Problem Set #19; Textbook chapter 1 due
4/19	Problem Set #20
4/21	Problem Set #21
4/26	Problem Set #22
4/28	Problem Set #23
5/3	Special Set on Cryptography
5/5	Cryptography Scavenger Hunt!
5/11	**Textbook project due at 4 PM**