

MATH 4460: Theory of Numbers

Spring 2022

Instructor: Tony Shaheen

E-mail: ashahee@calstatela.edu

Office Hours: to be announced in class.

Course Website: Follow the link from <http://www.calstatela.edu/research/ashahee/>

Canvas: All the zoom information and zoom recordings will be put on canvas.

Lectures: Monday and Wednesday, 3:05pm – 4:20pm, in SH 237.

We will start on zoom until the school tells us we can go back to campus.

Optional Textbook: There is no required textbook for the course. Here are some good books that are readable introductions to the field. The first is particularly good for this course.

- Number Theory - A lively introduction with proofs, applications, and stories, by Pommersheim, Marks, and Flapan. (This book is readable and covers pretty much everything that we will do in class.)
- An introduction to number theory, by Harold Stark. (This is another readable book for variety. It also has a cool chapter on Quadratic number fields at the end which leads into an area of math called algebraic number theory.)
- Introduction to analytic number theory, by Tom Apostol. (This is a good book that covers a lot more than we will do in class. It is a little more advanced than the previous two books and I wouldn't suggest it as one to use to follow along in the class but it's a good one if you want to go to graduate school. It also focuses on using analysis to attack number theory problems; for example, there is a great section on the zeta function and Dirichlet's theorem.)

Prerequisite: Math 3450 with a minimum C grade.

Description: In this course we will study the properties of the integers. Some of the topics that we will cover are as follows: primes, greatest common divisor, the fundamental theorem of arithmetic, solving certain Diophantine equations, congruences modulo n , Pythagorean triples, Gaussian integers.

Student learning outcomes: Students who successfully complete this course will be able to: 1. Prove basic properties about the integers and the primes; 2. Prove basic properties about the greatest common divisor; 3. Know how to apply the fundamental theorem of arithmetic and other results about primes; 4. Be able to solve linear Diophantine equations; 5. Understand congruences and integers modulo n and be able to use and prove theorems about these structures, including the theorems we cover in class; 6. Be able to make basic computations and do proofs involving the Gaussian integers; 8. Understand any other topics that we cover in class and be able to compute and prove theorems about these topics.

Grading: Your grade will be based on two tests and a cumulative final. Each exam will be worth 1/3 of your grade.

Homework: Homework will be assigned, but not collected. The homework problems and solutions will be posted on the course website.

Exams: All tests will be conducted through canvas. There are two tests and a final. The below dates are tentative. The final time/day is scheduled by the school and it may change.

Test 1: Wednesday, 3/9.

Test 2: Monday, 4/25.

Very Tentative Final Date: Monday, 5/16, 2:30pm – 4:30pm.

ADA statement: Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation. Let me know if you take your tests with OSD.

Academic honesty statement: Students are expected to do their own work. Copying the work of others, cheating on exams, and similar violations will be reported to the University Discipline Officer, who has the authority to take disciplinary actions against students who violate the standards of academic honesty.

Student responsibilities: Students are responsible for being aware of all announcements that are made in class, such as changes in exam dates, due dates of homework and papers, and cancellation of class due to instructor's absence. Students are responsible for announcements made on days that they are absent.

Students must check their CSULA email account regularly for information from the instructor and the Department. Failure to do so may result in missed deadlines or other consequences that might adversely affect students. Note that you can forward this email account to any other account of your choosing.