MATH 223 Spring 2021
Number Theory

Instructor: James Phillips
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Office Hours: Monday and Thursday 3:45 - 4:45, Tuesday and Friday 1:30 - 2:30
              and by appointment

Textbook: The primary textbook for this class is *Elementary Number Theory* by James Strayer. Other textbooks that cover similar material are *A Friendly Introduction to Number Theory* by Joseph Silverman and *Elementary Number Theory and Its Applications* by Kenneth Rosen. The former two also cover a wealth of applications if anyone is interested. All three books will have PDF versions on Sakai.

If anyone is looking for more advanced resources, I'm happy to chat and point you in the right direction.

General Policy: Classes will be held synchronously over Zoom at the scheduled time. You are strongly encouraged to attend synchronously, although I recognize that this may not be possible for some of you. All lectures will be recorded and posted to Sakai. Even though the course is held remotely, students are nonetheless encouraged to participate and ask questions during class; I also encourage you to have your camera on during class time, if possible. Class periods will be a mix of lecture and group-based problem solving.

In class, please be courteous: arrive on time and stay until in the end of class. Lectures are a good starting point, but the best understanding comes from getting your own hands dirty: give the material a look before lecture, and spend some time reviewing and practicing afterward.

All graded work will be collected through the website Gradescope. The graders and I will do our best to grade and return any work promptly.

This is certain to be a strange term. I will do my best to keep things as steady as possible, but our flexibility may very well be called on. Thus, communication will be vital. Even in a typical semester, I understand that things do come up. **If a circumstance arises that affects your performance in the course, you should inform me** *before* **it influences your grade.** If anything were to arise, we can work together to figure out an appropriate plan.

I reserve the right to modify this syllabus and the course as needed. Any changes will be announced before they can affect anyone's grade.

Topics: This course is meant to serve as an introduction to number theory. In the course of this, students will also begin working with more abstract mathematics and get experience with proof writing in general. Topics covered in this class include divisibility, prime numbers, mathematical induction, the fundamental theorem of arithmetic, congruences, modular arithmetic, Fermat's theorem, Wilson's theorem, quadratic reciprocity, Hensel's lemma, Dirichlet series.

Warm-ups: Starting with the third class period, there will be a short collection of warm-up problems due on Gradescope due one hour before class. I intend for these assignments to be relatively quick and will often use them to either give some practice for the previous class's material or lead into the current lesson. These will be graded primarily based on effort and engagement. Warm-ups comprise 10% of your overall grade in the course.

Homework: There will be two homework assignments per week, due at 7:00 PM Tuesday and Friday evenings. Homework assignments will often focus on developing one's proof-writing skills as well as one's mastery of number theory. Some problems may be difficult, so be sure to start early to give yourself time to work through problems that might take more creative energy. You are also welcome to work together on homework, but any work submitted must be your own. Late homework will not be accepted. Your lowest two homework scores, however, will be dropped. Homework comprises 30% of your overall grade in the course.

Quizzes: There will be a quiz each Monday covering the material from the previous week. Quizzes will often be a mix of computational and proof-centric problems. The quiz will be posted at 12:00 AM on both Sakai and Gradescope and should be submitted to Gradescope no later than 11:59 PM. You may use your notes on the quizzes but no other outside material is permitted. Working on quizzes together with other students is not permitted. Once you begin a quiz, there is no time limit beyond the 11:59 PM deadline. Your lowest quiz score will be dropped at the end of the semester. Quizzes comprise 35% of your overall grade in the course.

Exam: There will be a self-scheduled final exam following the term. Like quizzes, the final exam will contain a mix of computational and theoretical questions covering the material from the entire term. The final exam comprises 20% of your overall grade in the course.

Reflections: At the end of each week, I will ask you to complete a short reflection to let me know how things are going in the class. Often, I will ask what went well during the week and solicit any suggestions for change during the upcoming week. Reflections comprise 5% of your overall grade in the course.

Honor Code: On homework, collaboration is expected and encouraged. You should feel free to talk to other students while you are in the process of thinking about a problem. You will need periods of concentrated individual study, but it is also helpful to spend time talking about the subject. However, solutions should be written up on your own, to gain practice and confidence in your ability to problem solve. Exams and quizzes are completed individually. Feel free to direct any questions to me.

Accommodations: If you have a disability or condition, either long-term or temporary, and need reasonable academic adjustments in this course, please contact Accessibility and Disability Resources (ADR) to get a letter outlining your accommodation needs, and submit that letter to me. You should request accommodations as early as possible in the semester, or before the semester begins, since some situations can require significant time for review and accommodation design. If you need immediate accommodations,

please arrange to meet with me as soon as possible. If you are unsure but suspect you may have an undocumented need for accommodations, you are encouraged to contact (ADR). They can provide assistance including screening and referral for assessments. If the course schedule includes quiz or exam dates that conflict with your religious observances, please let me know at least one week in advance in order for us to make an alternative arrangement.

Resources: Anastacia Castro, our embedded tutor, will run weekly office hours. She has already mastered the course material and will be keeping pace with our class. Drop-in online tutoring is also available through the Math Department. A schedule will be posted when one is available.