

Instructor: Dr. Elisa Bellah
Meetings: MWF 11:15am-12:05pm
Location: Wean Hall 8201

Office: Wean Hall 8119
Office Hours: W 12:15-1:15pm, F 2-3pm
Email: ebellah@andrew.cmu.edu

Resource: Lecture notes will be updated weekly and posted on my site.

Course Description: Broadly, number theory studies the additive and multiplicative properties of the integers. In this course, we will explore this subject from elementary, analytic, and algebraic perspectives. Tentatively, we will look at the following topics:

- The Fundamental Theorem of Arithmetic
- Arithmetic Functions
- Prime Numbers and Primitive Roots (including applications in cryptography)
- Diophantine Analysis
- Quadratic Reciprocity
- Algebraic Number Theory
- Geometry of Numbers

Prerequisite: Algebraic structures (21-373) and either Matrix Algebra (21-241) or Matrix Theory (21-242).

Canvas: Course documents and information can all be found on the [course webpage](#), which is housed on my website (andrew.cmu.edu/user/ebellah). **Canvas** will be used for announcements, question submissions, and to post grades. You will be expected to access both Canvas and the course webpage frequently. I suggest you change your notification settings on Canvas to receive emails when course announcements are posted, as this will be the primary way I communicate with you.

Weekly Schedule: Unless otherwise specified, our weekly schedule will be as follows.

| Day | Agenda |
|-----------|---|
| Monday | Homework collected Lecture |
| Wednesday | Lecture Questions due Thursday morning |
| Friday | Discussion on Questions Lecture |

Assessment and Grades

There are three basic kinds of graded work you will be doing, which will be weighted according to the following scheme:

Question Submissions (5%): Each week, I will ask you to submit one or two questions on Canvas for us to discuss on Friday. Questions can either be for clarification on material you are having trouble with, or related topics you are interested in. I expect your questions to be detailed and thoughtful. For example, a question like “how do you do problem 1.2 on the homework?” will not receive any credit. A better way to ask this question would be to explain in detail what you have attempted and exactly where you’re stuck. Similarly, a question like “what’s the deal with elliptic curves?” will not receive any credit. Instead, explain how the content of this week’s lecture is related to elliptic curves, what research you’ve done on your own, and specific questions you have about these objects. Questions must be submitted no later than 10am on Canvas each Thursday, except for during exam weeks. I will choose some of these problems to discuss in class on Fridays. Notes that late submissions will not be allowed, but I will forgive three question submissions throughout the semester.

Homework (45%): Homework will be collected on Gradescope, and generally must be submitted no later than 7pm each Monday. A detailed description of my expectations will be included with each assignment, which I will provide

each week. Length of homework assignments will be based on material covered in lecture. A random selection of problems will be graded and returned to you within one week of submission. Late work will not be accepted without a verifiable excuse (e.g. a doctor's note), but I will drop your lowest two homework scores. There will be no exceptions for technology issues, so I suggest you upload your homework at least one hour before the deadline. Note that all homework assignments must be typed using LaTeX. If you have not used this typesetting software, you may find [this guide](#) helpful. Please don't hesitate to ask me for help with LaTeX during office hours.

Exams (50%): There will be one midterm exam and one final exam, each worth 25% of your overall grade. The final exam will only cover new material. You will be allowed a half page of notes for each exam. Specific information regarding each exam will be given as the exams get closer.

Course Policies

Absences and Late Work: If you need to miss a day, please do the following:

1. Contact someone from class for a copy of their notes. While my lectures will generally follow the notes posted on my site, there will often be additional information I provide in class.
2. If you are absent on an exam day, communicate this to me before the scheduled exam (it is strongly recommended you communicate this to me at least two days before the exam date if possible). Depending on your circumstance (e.g. illness, family emergency, etc), I may offer to schedule a makeup exam for you. If you do not communicate this to me ahead of time, or I do not feel your excuse merits a makeup, you will receive a zero on the exam.

Use of Resources: You are allowed to use whatever resources necessary to complete homework assignments, but ultimately the work you submit must be your own. If you lookup a homework solution, I expect you to rework the problem in your own words, and to site all resources used in your writeup. Any verbatim copying will be reported to the university as plagiarism. If you are unsure if you've used a resource properly, please ask during office hour. Note that I strongly suggest you attempt every problem on your own first. Learning to consistently solve problems on your own is the most important thing you can do to prepare for exams. If you rely too much on external resources to help you solve homework problems, you will not be prepared to solve problems on your own during in-class exams.

Regrade Requests: You may submit regrade requests for any assignment given during the semester. When submitting your request, please clearly indicate a justification for the regrade (e.g. points have been added correctly, mark does not match the rubric, etc). All regrade requests must be made on Gradescope ([here is a tutorial](#)) **within one week** of the assignment being returned to you.

Email: I will aim to respond to emails within one business day. Please note that I typically will not respond to emails outside of normal working hours (around 9am to 5pm) or on weekends. All emails must be sent through your CMU email address.

Additional Information

Student Academic Success Center: The SASC provides various programs to support student learning. Checkout the SASC's site (cmu.edu/student-success) for a full list of programs. In particular, I encourage you to consider their [peer tutoring](#). This is a tutoring service available to all CMU students at no additional cost.

Accommodations for Students with Disabilities: If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources (cmu.edu/disability-resources), I encourage you to contact them at access@andrew.cmu.edu.

Respect for Diversity: It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities

that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you