Math 157: Mathematics in the World

Spring 2024
Tuesday and Thursday, 3:00–4:15 PM

Teaching Fellow

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General Information

Description. This is a course on applications of mathematics in the world, with an emphasis on mathematical problem solving. We will discuss topics in elementary number theory, linear algebra, probability, combinatorics, and their applications such as public-key cryptography and game theory. These subjects will present us with a variety of interesting puzzles to solve along the way. We will also implement many of the algorithms discussed in class on a computer.

Classes will be highly interactive and focus on working on problems in small groups, with mini-lectures from the TF.

Office Hours. The TF and CAs will hold office hours each week. These will be scheduled after surveying the class. Feel free to reach out to the TF if you can't attend these office hours or wish to discuss the material further.

Website. Canvas is our official course website and will contain various announcements.

Prerequisites. Multivariable calculus. There will be a small programming component, but this course does not require any previous programming experience.

Grading. Your final grade will be determined by whichever of the following schemes gives the higher grade:

- 70% Homework
- 25% Final Project
- 5% Attendance

or

- 95% Homework
- 5% Attendance.

We use the standard scale for the final grade, with cutoffs at 93 for an A, 90 for an A−, 87 for a B+, 83 for a B, 80 for a B−, and so on. The scale may be adjusted in a manner favorable to the student, at the discretion of the teaching team.

Homework. Problem sets will be assigned weekly. Assignments are due on Saturdays at 11:59 PM, and must be submitted through Gradescope.

The lowest problem set grade will be dropped. Students who complete a final project may drop an additional two problem sets, for a total of three problem sets dropped.

Most problem sets will have a small Python programming component. Furthermore, problem set submissions are required to be typeset in LaTeX. We assume no previous experience with either. The CAs will provide tutorials, and learning resources will be posted on Canvas.

Final Project. The final project is an optional 5–10 page expository paper on some mathematical topic, due at the end of the semester. Students who complete the final project will receive an additional two homework drops. Students who wish to do a final project should let the TF know by the end of March.

For the paper, students generally choose a topic related to the course material and not already covered in class. Topics will be suggested throughout the semester, but students may propose their own topic. In any case, instructor approval is required. You will be required to submit an outline before the final due date, and also to meet twice with the TF or GCA to select a topic and talk through ideas for the paper.

The main requirement is that the paper must present a non-trivial proof or simulation/algorithm (or combine elements of both). No original mathematical work is required; it suffices to exposit some interesting, important result.

Attendance. We will take attendance randomly throughout the semester. If you must miss a class for a legitimate reason (including, but not limited to, athletics, illness, a religious observance, or a job interview), please let a course head know in advance and we will excuse it.

Course Policies

Collaboration. We strongly encourage collaboration on the homework.

Please acknowledge your collaborators by writing their names somewhere on your homework submission (even if they are not students in this class). Additionally, the final solutions you submit must be in your own words and reflect your own understanding of the problems. Rote copying of others' solutions is not permitted.

Late policy Homework is due at 11:59:59 PM. Assignments submitted after that time are subject to the following:

- Up to three assignments may be submitted within an hour of their deadline for no penalty.
- Each student will also receive three "grace days", which they can cash in for an extra 24 hours to submit an assignment. These can be stacked, so that e.g. one assignment can be submitted 72 hours late during the semester or three assignments can be submitted 24 hours late. A grace day cannot be split among multiple assignments. For instance, if a student submits four assignments 20 minutes late, then the fourth assignment will use an entire grace day. An assignment submitted at 1:01 AM will also use an entire grace day.
- Assignments more than three days late will not be graded and will receive a 0.
- Otherwise, late assignments will be penalized at the discretion of the teaching team.

Students do not need to contact the teaching team about late work; simply submit it to Gradescope as soon as you can and we will figure out how to apply the above policy to best benefit you. In particular, the final distribution of grace days will not be until the end of the semester, and will be accounted for along with homework drops.

Accommodations. If you require any learning accommodations, please talk to me (Grant), or have the appropriate Harvard office contact me.

We aim to create an enjoyable and welcoming learning experience. If there is anything we can do for you in this respect, please let us know. Additionally, if you have any questions, or need help with something related to the course (mathematical, administrative, or otherwise), please talk us in person or by email. We enjoy hearing from you.