Math 0025 – Geometry and art

Raison d'Être

The overarching goal is that you should learn to see the world differently, and that you should find this, at least sometimes, to be a mind-blowing experience. It might interest you to know that I learned a lot of the material for the first time in summer 2025, and I found it challenging and sometimes incredibly rewarding. I will say a little more about this on the first day of class.

– RP.

Instructors

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  Office hours: any time, by appointment.
  I will always be available Monday after class if you make an appointment beforehand.
- Hanan Jannoud, teaching assistant
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Course basics

Course website (we will not be using Canvas):

`https://www2.math.upenn.edu/~pemantle/Math0025-2025C.html`

Course materials:

- Number 2 pencils (recommend: get a pencil box, so you can carry sharpened pencils and don't have to keep sharpening one pencil over and over).
- At least one good, large, white eraser. We will be doing a lot of erasing!
- A straightedge ruler of at least 12 inches or 30 cm. You might find that decimal measurements on the metric scale make some things easier, but it's up to you.
- A bunch of plain white printer paper on which to do your drawings. Please don't use graph paper, lined paper, or paper of such low quality that erasing is difficult.
- Optional: a pencil sharpener you can bring to class; a second, longer straightedge; a compass for drawing circles.

Software: please install Geogebra on your laptop. It's free. We will have several occasions throughout the second half of the semester to use it. Versions I know will be compatible with our instructions are Geogebra Classic 5 and Geogebra Classic 6.

Course work, scope and grading

The course work will consist of in-class activities, homework, a final exam and a final art project. Goals for individual assignments will be given explicitly, but here are some overall qualities to strive for.

- Artwork should be clean (your high quality eraser will help) and correct.
- You should, in the end, be able to answer all the in-class exercises and be able to explain the reasons behind the answers.
- Mathematical homework should be well written and well reasoned.
- You should know all the definitions we have covered.
- You should know the perspective sketching techniques we have covered and be able to do them.

- You should have some ability to analyze a sketch and to reason through a math or perspective art problem.

Scope

We will cover all or some of the textbook, plus a small amount of material on finite projective geometry. The portion of the book we cover will be determined by what seems to be a reasonable pace given the makeup and abilities of the class.

Howework problems cannot be cleanly separated into mathematical work and artwork, but these two aspects will have roughly equal importance in your grade. To get a sense of this, you can look at the homework problems at the end of each chapter in the textbook, which will carry roughly equal weights, and are all labeled as one of three types.

- Exercises, similar to what we do in class. Some of these are short answers, together with reasoning. Others involve short bits of sketching.
- Art assignments: these involve sketching or photography. Often you will have a lot of choice as to your subject and how challenging a drawing to try to make.
- Proofs. These require you to settle mathematicially whether a given proposition is true. You will be able to do these using what you have learned in the class together with your knowledge of ordinary high school geometry (not fancy mathlete high school geometry).

Grading

The final exam and final art project together will carry roughly one third of the total grade for the course. The final exam will be an in-class exam, at a time to be scheduled by the registrar. It will consist of a mix of the above types of problem. The final project will be a take-home art assignment that captures many of the techniques we cover in the class.

Attendance, participation and in-class effort will also carry one third of the grade. In-class activities will not be graded for correctness, but you do have to be present to do them, and in the end, you have to know how they are supposed to come out (there is not always a single right answer). You can miss two class days without penalty. When you miss class for a Penn sanctioned activity, or illness or some other emergency, you will be able to make up the in-class work you missed that day.

Homework will comprise the remaining one third of the grade. There is no curve. In principle everyone could get an A. In practice, a grade of A or an A- is given for students that master the techniques of sketching and reasoning as well as can reasonably be expected. I state it in these terms because I won't know what's reasonable to expect until I meet you, hear about your background, and see how the first few weeks of the course go. After the first two homework assignments, I will give you a more explicit correspondence between the work I have seen from you and the grade this work would represent.

Policies

Screens

Please do not have your phones out in class. Set them to "Do not disturb". I will do the same. In the event that you expect an important call (doctor, employer, etc.), let me know and I will make an exception. The same goes for laptops, except for days on which we will use Geogebra. None of these will occur in the first half of the term and you will know in advance which days these are.

Collaboration

Collaboration is allowed, *provided you follow these rules*. Always turn in work that you have physically written yourself. When the intellectual content is collaborative, please name your collaborators at the top of page 1 of your homework. This includes classmates, tutors, Stack Exchange, AI, or anyone else you might discuss homework with. This doesn't mean that collaboration is recommended to the point that you are reliant on others. It is within everyone's grasp to do most or all of the work independently. Collaboration is useful for comparing answers, discussing ambiguities, seeing if there is more than one method or interpretation, and so forth. Collaboration on the final exam or project is not allowed.

Privacy

We're not goimg to be talking about the Middle East, or religion or politics, or pretty much anything controversial, but still it should go without saying, that no class discussion should be recorded, and that posting any footage from class is a violation of privacy rules and will have to be reported to the Penn Administration.