Math 465: Foundations of Geometry
Math 584: Euclidean and Non-Euclidean Geometry
Spring 2026

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Course web page:
https://people.math.binghamton.edu/mazur/teach/46526/46526.html

Meeting Time: W, F 11:00-1:00 in S2 259

Office Hours: M 2-3, W 4-5. Also by appointment.

Textbooks:

- *Geometry: Euclid and Beyond*, by Robin Hartshorne.
- *Elements*, by Euclid.

This course is a 4-credit course, which means that students are expected to do at least 12.5 hours of course-related work or activity each week during the semester. This includes scheduled class meeting times as well as time spent completing assigned readings, studying for tests and examinations, participating in lab sessions, preparing written assignments, and other course-related tasks

Course content: The objective of this course is to present a solid axiomatic foundation for geometry. The course will start with Hilbert's axiomatization of geometry and its relation to Euclid's *Elements*. Various models of the axioms will be discussed. Numerous classical results from plane geometry will be rigorously proved. Although the mathematical prerequisites for the course are few, there will be many proofs done in class, and you will also need to prove results on your own in the homework and provide (simpler) proofs on exams. Additional topics (not covered in the book) may be discussed in class.

Learning objectives:

- Learn basic results from Euclidean geometry of the plane (including the first 4 chapters of Euclid's "Elements")

- Understand the axiomatic foundation of geometry (and the need for it).
- Understand the concept of a model for a set of axioms.
- Learn the construction of non-euclidean geometry (hyperbolic plane) using properties of inversions.

Homework and Classwork: Homework will be assigned regularly. Assignments and corresponding due dates will be posted on the course web page. Solutions will be collected and graded. Quizzess will be given frequently.

Tests: There will be two tests and a comprehensive final exam. In addition, there will be quizzes given at least once a week. **No make-up tests or quizzes unless there are some extraordinary circumastances. Any such circumstances should be well documented and communicated to your instructor ahead of time.**

Any request for special accomodation (for example, from the Services for Students with Disabilities (SSD)) has to be communicated to your instructor ahead of time (ideally at the beginning of the semester).

Date of the tests:

- Wednesday, March 18
- Wednesday, April 22

Date of the final exam: TBA.

Grading Policy: The final grade will be based on the test scores, the final exam and the quizzes weighted as follows: each in-class test 20% , the final 40% and the total for all quizzes, homework, and classwork 20%.

Academic Honesty: All students are expected to adhere to the Student Academic Honesty Code.

Final Remarks: You are responsible for attending class, behaving in class, taking class notes, doing homework problems, asking for and coming in for help, etc.; in the end, you are responsible for your success in this class so work hard!

Students are expected to attend every scheduled class. Instructors have the right to deny a student the privilege of taking the final examination or of receiving credit for the course, or may prescribe other academic penalties if the student misses more than 25 percent of the total class sessions. Excessive tardiness may count as absence. [University Bulletin]

Late arrivals, early departures, cell phone conversations, eating, or drinking in class are not appropriate. It is your responsibility to keep informed of all announcements, syllabus adjustments, or policy changes made during scheduled classes and/or posted on course web-page.

Both class attendance and systematic work on the homework problems are crucial for the success in this class.

All the above information is tentative. I reserve the right to make reasonable changes if I find it necessary.