

MATH 402 Non-Euclidean Geometry

Fall 2017

Instructor: Emily Cliff

Lectures: X13 MWF 12pm 347 Altgeld Hall
F13 MWF 2pm 243 Altgeld Hall

Availability:

- *Office Hours:* Mon. 3:00–3:50pm, Thurs. 11:00–11:50am, or by appt. (165 Altgeld Hall)
- *Email:* ecliff AT illinois.edu

Official course description: Historical development of geometry; includes tacit assumptions made by Euclid; the discovery of non-Euclidean geometries; geometry as a mathematical structure; and an axiomatic development of plane geometry.

Prerequisites: MATH 241; MATH 347 or MATH 348, or equivalent; or consent of instructor.

Textbook: Geometry (with Geometry Explorer), Michael Hvidsten

This book is out of print, but the author has generously made an electronic copy available for personal use. It can be found at <http://new.math.uiuc.edu/public402/Hvidsten.pdf>.

Software: Geometry Explorer.

Download from <http://homepages.gac.edu/~hvidsten/gex/download-3.0.html>.

Grading scheme:

Project reports	10%
Homework	15%
Midterm exams	3 x 15%
Final exam	30%

- **Reading assignments** for each class will be announced ahead of time. These should be *completed before class*, and re-read after class as many times as necessary. Reading and learning mathematics is a slow process and requires a lot of reflection. Here are some hints:
 - When reading a proof, close the book often and try to work out an argument independently. This can be done before as well as after reading the argument from the book.
 - Discuss with others. Your classmates are a great choice as they'll have thought about the material as well, but sometimes just the fact of expressing your ideas out loud helps to shape and improve them.
- One class a week, usually on Friday, will be denoted to group work. You will be given **worksheets** of problems, which you will solve in teams of 3–4 students. To get the most out of this activity, it is extremely important to come to class prepared, i.e. have the reading assignments absorbed. You will not be required to hand in the worksheets, but it

is expected that you will complete them. The exams will include material directly related to the worksheets.

- Almost every week a **project** will be assigned, a **report** for which needs to be turned in the following Monday in class. You will be asked to perform some experimentation with a mathematical phenomenon using the Geometry Explorer software. Moreover, you will supplement that with formal reasoning in order to understand the patterns or mathematical laws at play. The assignment will be to write a report on what you have learned and how, in addition to any formal exercises contained in that section of the text.
- **Homework** will be assigned weekly, due every Friday at the beginning of class. These will be problems to be solved in a formal mathematical way, and the correctness of the argument will matter. Assignments will be graded out of approximately 50 points, and an additional 5 points will be awarded based on neatness and organization. To earn these points, make sure you label your assignment and each question clearly, staple all pages correctly, and type your solutions or write them out neatly. These requirements apply to the Projects as well.

Crucial: You are strongly encouraged to discuss homework problems and project reports with your classmates. However, you must write the assignment on *your own*. This does not mean simply the physical act of writing, but that the write-up should be done independently. Your submitted paper should include the names of your collaborators (or discussion buddies), as well as all sources consulted.

Assignments are given to fulfill two purposes: first, to allow you to practice and gain a better understanding of the concepts covered in the lectures; second, to give feedback both to the student and to the instructor on how well the material is being understood, so that the student knows where to focus his or her attention in studying, and so that the instructor can adjust the pace of the course or go back and cover material that everyone is struggling with. Although it is tempting for students to try to get better grades on their homework by copying answers that they don't fully understand, or by giving vague answers to cover up their confusion, this defeats both of the purposes of the assignment, and ultimately will be a barrier to getting the most out of the class. Don't do this. In calculating your final grade, *I will drop the lowest two grades of your completed and submitted assignments.*

- **Participation:** Everyone is expected to be an active class participant. I will not take attendance, but I will notice frequent absentees.
- **Midterm exams** will be on the following dates, during class time:
 - Exam 1: Friday September 29
 - Exam 2: Friday November 3
 - Exam 3: Wednesday December 6
- **The final exam** will be comprehensive.
- **Office hours** are your chance to learn from the instructor in an informal setting. To best profit from them, come prepared with questions.