Math 5700: Intro to Geometry

Instructor: Walker H. Stern
Email: ws7jx@virginia.edu
Office: Kerchof 311

Class Meetings: MWF 1:00-1:50pm (Zoom link on Collab)

Office hours: Wed 3:00-6:00pm or by appointment. *Please feel free to make an appointment to talk outside of office hours if these are inconvenient!*

Course text: *Geometry*, 2nd ed., by David A. Brannan, Matthew F. Esplen, and Jeremy J. Gray. Cambridge University Press
ISBN: 978-1107647831

Course Overview: Our aim here is to provide an overview of various *geometries*. The most familiar geometry for most of you, *Euclidean Geometry*, can be seen as a prototypical example — Geometry concerns itself with the study of shapes: points, lines, polygons, conics, etc. This semester we will take a tour of various geometries: Euclidean Geometry, Affine Geometry, Projective Geometry, and (time permitting) Hyperbolic Geometry.

In this course, we will adopt the perspective — associated with Felix Klein in modern mathematics — that to understand a *geometry*, all one need do is understand its *symmetries*. To this end, we will also be discussing some basic group theory, so as to give us a language to describe symmetry transformations.

Online Learning: Owing to the COVID-19 pandemic, this course will be entirely remote (online synchronous). Lectures and office hours will take place via Zoom, and assignments will be made available and submitted via Collab/Gradescope.

Please do *not* use mock/joke names in class-related Zoom rooms. I reserve the right to boot users whose names I do not recognize.

Etiquette for online meetings

- Class meetings will *not* be recorded.
- Use a headset or earbuds to be sure you can hear and be heard easily when speaking, and to prevent echo.
- Please keep your microphone muted when you are not speaking so as to reduce background noise.

- Please be mindful to avoid interrupting other students.
- If I am writing, I may not be able to see the 'raise hand button' You should always feel free to simply unmute and ask your question.
- Students are *strongly* encouraged to turn their video on during class time. This helps me gauge how well you are following the material, and provides a somewhat more interactive environment.

  Note: If your video is on, make sure you're dressed appropriately for class.
- We will have to adjust to quirks of the technology as time goes on. *Feel free to make suggestions to me after class on improving the 'classroom' experience.*
- If I lose internet access or power and cannot hold class, one of my colleagues, Filippo Mazzoli, will contact you to inform you that the lecture is canceled.
- If technical issues prevent you from participating in a class session, feel free to contact me, and we can discuss material that you missed.

Prerequisites

- Math 2310 & Math 3351

Mental Health & Wellbeing

University study can be stressful, and the material in this course will likely be very new for many of you. You should always feel free to contact the me, both with questions about the material and with any other concerns about the course.

This semester will be held entirely remotely, which can feel stressful, isolating, or anxiety-inducing. The University of Virginia offers a number of helpful resources for students. Psychological counseling for students is provided by Counseling and Pyschological services (CAPS). Alternatively, there is the anonymous HELP line run by Madison House.

Evaluation & Grading

Percentage grades in the course will be assigned according to the following weighting:

Homework & Classwork	30%
Midterm 1	20%
Midterm 2	20%
Final Project	30%

Homework: Weekly written homework assignments will be partly written by me, and partly taken from the textbook. These will be submitted via *Gradescope*, which is accessible from the course Collab page. **You are encouraged to work together on the homework. However, each student must write up and submit solutions individually. Submissions must be in PDF format.**

Attendance and Classwork: While I will not take attendance for any class session, some class time may be set aside for in-class work, which will count towards the homework

grade. Students will lose credit for classwork during any class session they do not attend.

Midterms: There will be two midterms, tentatively slated for mid-March, and mid-April, respectively. The midterms may involve both take-home and in-class components.

Final project: The course will culminate in final group projects. These projects will require you to explore material beyond what we have discussed in class, write a cogent, expository summary of that material, and present that material to the class. More information on the final projects will be provided as the semester progresses.

Accommodations: Students with a disability which requires accommodation should contact the Student Disabilities Access Center (SDAC). Students without accommodation letters from the SDAC will not be provided accommodations in class or on exams.

Academic Honesty: All exams in this course fall under the purview of the UVA honor code. Remember to pledge each examination.

Instructor Communication: Throughout the semester, I will send you emails through the course Collab page. You are responsible for the contents of these communications. These communications may include the scheduling of examinations, cancelled or rescheduled classes, or information about homework. You may communicate with the me via email, Collab, or Zoom (the latter by appointment or during office hours).

Meet your instructor: This is my second semester as a postdoc at UVA. Before coming here, I worked as a postdoc at Universität Hamburg in Germany. I completed my doctoral studies in 2019 at Universität Bonn, also in Germany. I specialize in higher category theory — a branch of mathematics sometimes referred to as "generalized abstract nonsense." For anyone interested, my professional webpage is walkerstern.gitlab.io