

Math 629: Equivariant Methods in Algebraic Topology Course Syllabus

Meeting

We will meet in the Seminar Room of the Math Department 12-2:40 on Wednesdays. Office hours will be Mondays, 1-2pm, and by appointment before class on Wednesdays.

Course Content

This course will cover some basics of group actions in a variety of settings, for several different kinds of groups. The first portion of the course will cover an introduction to group actions, Lie groups, representation theory, toric varieties, vector bundles and sheaves with group actions and algebraic invariants of these. Individual students will have projects that extend their knowledge significantly into related questions.

Philosophy

This course is in part designed to teach students how to learn mathematics independently and will have significant portions that are aligned with a students' interest. The focus is on group actions with associated geometry and algebra, however this umbrella is insanely large, which allows us to go in multiple directions. I hope that I also will learn something from you in this course!

Grading

My desire is that everyone earns an A in this course!

Problem Sets (~5-7 total) 35%

In-class participation 10%

Problem sets based on presentations (~6-8 total) 10%, peer-assessed

Final Presentation 20%

Final Paper 25%

There is no final exam in this course.

Course Structure

I will be lecturing and providing problem sets for the first $\frac{1}{2}$ of this course. We will have presentations for the last 4 weeks of the course, and these presentations will include problem sets written for other students. In the middle, there will be a few weeks with no formal classroom time in which I will be conducting individual meetings with students, and you will be making significant (measurable) progress toward your projects.

Projects (Presentation & Problems & Paper)

Students will be involved in an extensive learning project where the goal will be an excellent presentation and paper that explains a possibly well-known mathematical idea in a new way, with some examples and potentially new insight, proofs, or examples. Each project will have a couple exercises that the other students do, which will be collected *and graded* by the creators of the problems.

The projects may be done individually or in a group of two students. All projects need to be approved, but groups of two need to have approval from me specifically for working together for any additional expectations for a group project. Presentations will generally be longer/in-depth for joint projects, with additional exercises and longer (jointly authored) papers. Additional information about the projects will be forthcoming, including some choices for topics, expectations for meeting specific benchmarks, etc.