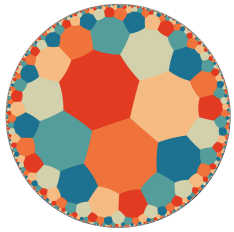


Math 301
Representation Theory

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OVERVIEW

Hermann Weyl famously observed that symmetry is the "one idea by which man through the ages has tried to comprehend and create order, beauty and perfection." In the 19th century, mathematicians formalized the concept of a group–a single mathematical object that captures the essence of symmetry and allows it to be analyzed, dissected, and classified. Representation theory seeks to decompose these complex symmetries into their most fundamental, atomic pieces. For finite groups, this results in an elegant, complete theory which fits together like a puzzle box. In this Inquiry-Based Learning course students will work together to develop the representation theory of finite groups from scratch through problem solving and discussion. Besides building their mathematical chops, students will also work on developing their presentation skills.

MEETING TIMES & OFFICE HOURS

Lecture: Monday and Wednesday, 1:30 to 2:45 pm, Rocky 304.
Office hours: Monday and Wednesday 3 to 4 pm, Thursday 1 to 3 pm.
My office is 403 Rockefeller Hall (take a left at the top of the stairs, end of the hall on the right.)

RESOURCES

There is no text for this class. You will develop the theory yourselves, guided by a series of problem sets and your own curiosity.

There are three important digital resources for this class:

1. **Course website.** The homework, `tex` templates, and handouts will all be available here. Besides the standard `pdf` versions, there will be `html` versions of the homework posted on the site which may be more convenient for viewing on various devices. This is an experimental system I am working on, so **please let me know if you spot any errors or issues or have ideas for improvements.**
2. **Moodle.** You will submit homework via Moodle. Please submit **both your `pdf` and `tex` files**.

RESOURCES (CONTINUED)

3. **Discord.** We have a course Discord server. This is how I will make announcements and is the easiest way to reach me. I encourage you to post questions here. You are welcome to DM me at any time, I will get back to you as soon as I can. Please join and set your server profile name to your preferred full name.

HOMEWORK

There will be weekly problem sets posted on the course website. All homework submissions must be typeset in LaTeX. You will submit **both your .pdf and .tex files** on Moodle. I will provide you with templates for writing your solutions and I strongly prefer you use these templates as it will make grading less of a headache (and when I do not have a headache, I am a nicer grader). There will be both individual and group assignments.

PRESENTATIONS

Everyone will be asked to give multiple presentations throughout the semester. Learning to effectively communicate mathematics is a valuable skill which also helps you learn more deeply. We will work together to develop these skills throughout the semester.

FINAL PROJECT

In lieu of a final exam we will have a final project. Details will come later in the semester. There are no exams in this course.

AI POLICY

AI tools are incredibly helpful for learning and discovering mathematics. However, there is such a thing as being *too helpful*. You are currently in the rigorous phase of your mathematical development, and to build these muscles it is critical that you wrestle with the mathematics yourself. Along with no texts, **no AI tools are allowed for this course**. Use your own mind and those of the people around you instead. It will be worth it, I promise.

EXPECTATIONS

You are expected to attend and participate in class. I expect you to write your own solutions to homework and to give explicit credit to any sources you consult (and with the exception of the final project, you should not be consulting any other sources). If you are unsure if something is

EXPECTATIONS (CONTINUED)

considered a breach of academic integrity, please discuss with me. Most importantly, I expect you to be respectful to everyone in the class.

LATE POLICY

Homework turned in within 24 hours of the deadline will be docked a 5% penalty; homework turned in more than 24 hours late but less than 72 hours late will be docked a 10% penalty; anything turned in more than 72 hours late needs to be discussed with me before it can be considered for credit. **Everyone gets one free, no-questions-asked late assignment to be turned in within 72 hours of the deadline. This will be applied to the first assignment that is turned in late. You do not need to ask me permission to use it.**

ACCOMMODATIONS STATEMENT

Academic accommodations are available for students registered with the Office for Accessibility and Educational Opportunity (AEO). Students in need of disability (ADA/504) accommodations should schedule an appointment with me early in the semester to discuss any accommodations for this course that have been approved by the Office for Accessibility and Educational Opportunity, as indicated in your AEO accommodation letter.

BASIC NEEDS POLICY

Your safety and well-being are more important than anything going on in class. Please reach out to me if you need to talk. Any student who faces challenges securing their health, housing, food, or personal safety is urged to contact Luis Inoa (`inoa@vassar.edu`), Associate Dean of the College for Student Living and Wellness, for support. If you feel comfortable notifying me, I will do what I can to connect you with resources. **For on-campus emergencies, please call 911 or the Campus Response Center (CRC) at 845-437-7333.**