

Syllabus for Math 238: Rice Connect, Spring 2021

Instructors: Sarah Frei and Morgan Weiler

Time: W 12:15-1:10 Central. No class: W 2/17.

Room: Canvas, Zoom, and <https://math.rice.edu/~mw79/riceconnect.html>; all important information and virtual “locations” will be linked from Canvas.

Text: Various readings will be provided throughout the semester on Canvas.

Contacting us: sarah.frei@rice.edu and morgan.weiler@rice.edu, or Canvas message

Office Hours: Wednesdays 3-4, on Zoom.

Outline of topics: Math 238: Rice Connect is designed to create a community of students with similar intellectual interests. It will be based around small group meetings focusing on sharing ideas and learning new skills within the math major, providing a supportive intellectual community for students interested in the math major or minor. However, you do not have to be a major or minor in order to participate – the only prerequisite is an interest in math!

We will explore a wide range of areas of math based on student interest, including but not limited to: the mathematics of music, lattice point counting and discrete volume, the geometry of billiards, the mathematics of voting, the role of math in science, ruler-and-compass constructions, and solving cubics and higher-degree polynomials. We will also discuss major aspects of life as a math major, including how to navigate the transition to college-level math and to higher-level math courses, how to attend math talks, the different roles of the major areas of math (e.g. analysis vs. algebra), and stereotypes of mathematicians and other interactions between math and society, including the experiences of mathematicians from varying backgrounds.

This class is discussion-based, so attendance is important. However, if you are interested in taking this class and are in a different time zone which makes it difficult for you to make the 12:15-1:10 time, please email me and Sarah.

Assessment: This class is graded Satisfactory/Unsatisfactory. Your grade will be computed using the following formula:

$$60\%(\text{attendance and participation}) + 30\%(\text{assignments}) + 10\%(1-1 \text{ meeting attendance})$$

Because we only have 13 class meetings, attendance is required. You are allowed to miss one class period without an excuse. If you know in advance that you must miss two or more class periods, you must let the instructors know by the end of the first week of class; all other absences will be unexcused, unless you have a documented medical or family emergency.

Logistics: This class will be taught online. Here’s an outline of your responsibilities for a typical (non-exam) week:

Reading and response: Each week, you will complete the assigned reading and write a 1-2 paragraph response to the prompts we give you, collecting your thoughts about the reading for discussion during class. Some weeks, in place of a reading, you will be asked to watch a recorded lecture video. You will submit your response before class on Wednesdays, on Canvas. Your work will receive full credit as long as it’s clear you were thoughtful in your response.

Math problem: Each week you will also have an exploratory math problem to think about. These will be designed to teach you about topics you may run across in your day-to-day life, which are used in modern math research, or which are historically important (e.g. illustrating a famous unsolved problem). *You will not always be expected to “solve” the problem!* You will submit your work along with a short paragraph written summary of what you did before class on Wednesdays, on Canvas. Your work will receive full credit as long as it’s clear you put in at least an hour of serious effort.

Class time: In class, we will discuss the week’s reading and math problem. Some weeks we will have a short presentation by the instructors.

In addition to the weekly requirements, you will need to complete the following throughout the course of the semester:

1-1 meetings: You will need to schedule and attend two twenty-minute 1-1 meetings with either Morgan or Sarah throughout the semester. This will be a chance to discuss your academic and professional goals and concerns.

Project: There will be an end-of-semester project, due on the last day of class, April 28th. You will either

- attend an undergraduate colloquium (such as the Mathematics Undergraduate Colloquium) and write a report of the talk
- interview someone who’s doing something mathematically interesting to you (e.g. a grad student or someone with a job you are interested in) and write a report of your conversation
- another project of your choice which you discuss with Sarah or Morgan in advance

You can do the project alone or with a partner.

Topics

In the first week, we’ll ask you to let us know which topics you are most interested in so that we can prioritize those in our schedule.

- Introductory meeting: transitions from high school to college, and from calculus to advanced math courses
- How to be successful in a technical class: how to talk to professors about math in office hours, how to have productive and respectful collaborations with peers on hw and projects, how read a math textbook.
- Learning theory, growth and fixed mindsets, and dealing with imposter syndrome and failure.
- Math skills: attending talks (and class)
- Math skills: writing expository math
- Paths through the major: what will you learn in the major, and what is it used for? What are major research areas of math (analysis/algebra/geometry/topology/applied math/logic), and why do I need to know analysis if I want to research number theory?

- Math history and social context
- The academic track: what is an academic pure/applied math career, and what is the process? Specifically, what is the process for preparing for and applying to a graduate program?
- Industry jobs/internships
- Equity, inclusion/exclusion, the effects of racism, and other access/community issues in mathematics
- Math skills: a buffet of fun theorems and open problems which we will learn the history of, think about examples, removing/adding hypothesis, and generalizations
- Math/science people in media, math stereotypes and how they affect you
- Interesting math I learned this year: brief project reports

We'll also be working on problems throughout the semester to explore different areas of math which you might not come across in your regular classes.

- Pick's Theorem, lattice point counting, and discrete volume
- Spherical, Euclidean, and hyperbolic geometries
- Geometry of billiards
- Math and music
- Ruler-and-compass constructions (more generally, algebra and geometry)
- Solving polynomials
- Workshopping proofs

Accommodations: If you require accommodations due to a disability, please let us know *at least two weeks in advance* of the part of the course for which you will require an accommodation. Please also make sure this documentation is on file with Disability Resource Center (Allen Center, Room 111/adarice@rice.edu/x5841) to determine the accommodations you need.

This semester may present unique challenges to all of us due to COVID-19. Please let us know if there are any unexpected or unusual difficulties which significantly impact your ability to engage with the course.

Statement on collegiality, respect, and sensitivity: The Dept of Mathematics supports an inclusive learning environment where diversity and individual differences are understood, respected, and recognized as a source of strength. Racism, discrimination, harassment, and bullying will not be tolerated. We expect all participants in mathematics courses (students and faculty alike) to treat each other with courtesy and respect, and to adhere to the mathematics department standards of collegiality, respect, and sensitivity

math.rice.edu/department-statement-collegiality-respect-and-sensitivity

as well as the Rice Student Code of Conduct. If you think you have experienced or witnessed unprofessional or antagonistic behavior, then the matter should be brought to the attention of the instructor and/or department chair. The Ombudsperson is also available as an intermediate, informal option, and contacting them will not necessarily trigger a formal inquiry.

Title IX statement: Title IX Responsible Employee Notification

Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination or gender discrimination or relationship, sexual, or other forms interpersonal violence to seek support through the SAFE Office. Students should be aware when seeking support on campus that most employees, including myself, as the instructor, are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. For more information, please visit safe.rice.edu or email titleixsupport@rice.edu.

This syllabus is subject to change at any time. We will do our best to inform students of all such changes as quickly as possible.