MATH 113 S01 & S02: DISCRETE STRUCTURES
COURSE INFORMATION & SYLLABUS

SPRING 2026

Instructor:	Kyle Ormsby (ormsbyk@reed.edu, Lib 306)
Time & Place:	S01 — MWF, 10–10:50 in Lib 389
	S02 — MWF, 12–12:50 in Chem 301
Office Hours:	Tu 13–14, Th 14:30–15:30 & by appointment
Course Assistant:	Vivek Malik (vsmalik@reed.edu)
Problem Sessions:	TBD
Textbook:	Discrete Structures by Ormsby & Perkinson
Website:	kyleormsby.github.io/113/
Zulip:	math113-s2026.zulipchat.com/
Forms:	Absences
	Homework extensions

Course description. This course is a rigorous, problem-centered exploration of the mathematics of discrete structures focusing on the following subjects:

- *Combinatorics* tells us why there are 40,320 ways to place eight non-attacking rooks on an 8×8 chessboard. We will learn how to count permutations, combinations, and other collections, develop the language of sets and functions, and utilize basic proof techniques like the pigeonhole principle and mathematical induction.
- *Probability* tells us why it's likely that two people in a class of 23 students share a birthday. We will study conditional probability, Bayes' Theorem, and expected values.
- *Number theory* tells us why we shouldn't try to solve the equation $a^3 + b^3 = c^3$ with nonzero integers. Topics include divisibility, prime numbers, the Fundamental Theorem of Arithmetic, modular arithmetic, and Fermat's Little Theorem.

Learning outcomes. After actively and thoughtfully engaging in this course, students will be able to:

- demonstrate an understanding of the topics above;
- apply this understanding in mathematics, science, technology, and other contexts;
- work as part of a small group to solve mathematical problems; and
- communicate mathematical ideas verbally and in writing.

Distribution requirements. This course can be used towards your Group III, "Natural, Mathematical, and Psychological Science," requirement. It accomplishes the following learning goals for the group:

- Use and evaluate quantitative data or modeling, or use logical/mathematical reasoning to evaluate, test or prove statements.
- Given a problem or question, formulate a hypothesis or conjecture, and design an experiment, collect data or use mathematical reasoning to test or validate it.

This course **does not** satisfy the "primary data collection and analysis" requirement.

Course design. Nearly all of our meetings will break down into four components:

- *Reading.* Every class will have an assigned reading which you must complete and engage with **before** we meet.

- *Online lecture.* A short online lecture and quiz accompanies each reading assignment and must be completed **before** class. After taking the quiz, you are encouraged to discuss the video and ask questions on our Zulip channel.
- *Active class sessions.* Our 50-minute meetings will focus on group work with your peers. Collaborative problem-solving will allow you to interact with and grow your understanding of the material. There will be many opportunities for presenting solutions to your classmates.
- *Homework.* I will assign two or three harder homework problems for you to complete after class. These are due two class periods later via Gradescope (at 10pm).

The purpose of this structure is to scaffold your learning so that you will first engage with easy quiz problems based on your reading and the recorded mini-lecture, then bolster skills through collaborative problem-solving, and finally gain mastery over content by engaging with homework problems.

Here's an example of how the course design will play out in practice: Suppose that it's Friday of the second week of classes. You'll complete the reading, lecture, and online quiz related to that day's content before class. We will then spend the class period engaged in group work related to the reading assignment and recorded lecture. You will leave that class prepared to work on the homework problems which are due Wednesday of the third week. By 10pm, you will use Gradescope to turn in the homework problems related to the content delivered on Monday of the second week of classes. If you have difficulty with the homework problems or any of the course material, you could attend office hours. You could also work on the problems with peers, attend the evening session or drop-in tutoring, or ask a question via email or Zulip.

Joint expectations. We share the responsibility of creating a learning community in which we will interact through class discussions, one-on-one conversations, group work, office hours, and online via Zulip. All conversations should be respectful and should have the goal of advancing understanding, not competing or showing off. This learning environment might be new and challenging to you, so we hope you will let us know if you are having trouble. You should expect that the instructor will be available, will be fair to all of you, will encourage you to find your voice, and will provide feedback and guidance that will help you.

Class attendance and participation. Because of the nature of this class, attendance will be taken, and you are expected to be present on time and engage in class, when your health allows. You are **allowed 3 unexcused absences** throughout the semester (no questions asked). More unexcused absences will affect your grade.

If you find yourself sick, please fill out the absence form (see below), and then stay home. Each community member has an individual responsibility to help protect each other's health and wellness through conscientious behavior. I will make a good faith effort to help meet reasonable accommodations for anyone who must miss class and is communicative.

If you miss class (excused, unexcused, or otherwise), it is your responsibility to fill out this absence form.

Text. The course will use *Discrete Structures* by Ormsby and Perkinson as its primary text. This is a free PDF file available online. Previous iterations of Math 113 have used *Discrete Mathematics: Elementary and Beyond* by Lovász, Pelikán, and Vesztergombi as a textbook; you may find it useful as a supplementary text.

Academic accommodations. If you have a documented disability requiring academic accommodation, please have Disability & Accessibility Resources (DAR) provide a letter during the first week of classes. I will then contact you to schedule a meeting during which we can discuss your accommodations. If you believe you have an undocumented disability and that accommodations would ensure equal access to your Reed education, I would be happy to help you contact DAR.

Pre-class work. As noted above, you are expected to do the reading and watch the video lecture **ahead** of class. There is a quiz embedded in the lecture which will be graded only on completion, not on correctness. It is very important for you to do this work, as the class activities assume that students have had exposure to the material. You are not expected to understand everything — that's the point of class, after all –, but

you are expected to be familiar with the concepts introduced. Each student is allowed **5 instances of not completing the quiz on time**.

Homework. Your homework assignments will be due via Gradescope at 10pm every class day (most Mondays, Wednesdays and Fridays), based on the content covered two meetings prior (so for example the homework due on Friday is based on the material covered on Monday). The **5 lowest scores will be dropped**. See the late work section below about extensions.

Solutions should use complete sentences. An ideal solution is written as an explanation meant for other students in the class. You might find it helpful to typeset your solutions using LaTeX. Make sure you use complete sentences, even when formulas or symbols are involved.

The purpose of homework is for you to solidify your knowledge by putting it into practice. Some of the problems in the homework will be basic computations, and it might seem that you are not learning much from doing these. After all, you probably will never do these computations by hand in the future, in particular since there is software that can do that. It turns out that by thoughtfully doing these computations you can figure out trends that are deeply related to the theory that we are learning. In other words, these careful computations can be a means for better and deeper understanding. Most of the problems though will involve proofs. These will be challenging, and many of you will probably struggle with some of them. You should know that struggling is ok, it is how we learn.

So the homework can serve its purpose, I recommend the following:

- start early, don't wait until the night before it's due to look at it;
- read all the problems carefully, identify the ones you can solve right away and the ones you can't;
- review your notes and the book carefully (I recommend doing this *before* trying to attempt the problems);
- make an honest attempt to solve all the problems;
- talk to others, you can really learn from each other (make sure you don't just get the solutions from someone else, and that you are learning and understanding from this process);
- if needed, go to office hours, the evening sessions, tutoring sessions, or meet with an individual tutor;
- give yourself enough time to write down your solutions.

Each problem in the homework is graded taking into account both the mathematical content and the quality of writing, according to the following scale:

5 — perfect
4 — minor mistakes
3 — major mistake, right idea
2 — wrong but contains a significant idea
1 — wrong but contains a relevant idea
0 — none of the above

Exams. There will be three in-class midterm exams and a final exam. You will be allowed one double-sided sheet ($8.5'' \times 11''$) of notes for each of them.

Tentative schedule:

- Exam 1: Wednesday February 18
- Exam 2: Wednesday March 11
- Exam 3: Wednesday April 15
- Final exam: during finals week (May 11-14), as scheduled by the registrar.

You will receive an opportunity to rewrite the exams after they have been graded. The specifics will depend on the circumstances, and you will have at least a week once the assignment is posted. Because of timing, there will not be an opportunity to rewrite the final exam.

Late work. Each student is allowed **5 extensions of 48 hours for homework** (no questions asked). To request an extension, you must fill out this extension form **before** the assignment deadline. Further extensions will not be granted except under extraordinary circumstances. There are no extensions on pre-class quizzes or exams (unless there are exceptional circumstances).

Academic integrity, collaboration, Internet, and AI policy. All work submitted should be your own. I encourage you to work on homework together as this is a great way to learn. But **you must write up your own solutions independently**. For total disclosure, if you use any resources other than your experience and course materials, include a citation or acknowledgement. This includes listing your collaborators and tutors. Uncited use of external resources constitutes academic misconduct. For exams, no collaboration is allowed.

The Internet is a great source of information about mathematics; you are welcome to search information about the material of the course online, but you should not search for solutions to specific problems in the homework. You should not consult solutions to homework and exams from previous versions of this class.

Students **may not** consult AI chatbots (chatGPT, Gemini, Claude, *etc.*) when working on homework.

Why does this course have these policies? Your job as a student is to think, and my job as a teacher is to inquire into your thinking so that I can help you think more like an expert. If you submit computer-generated solutions, then you aren't doing your job, and I can't do mine.

Grades. Your grade will be based on your performance on the homework, the three midterms and final exam, your rate of completion of the quizzes, and your attendance and participation.

Zulip. Both sections of Math 113 have a joint Zulip channel. Use the Zulip channel to ask questions, collaborate on problems, and share resources. The Zulip channel is an extension of our classroom. You will receive an invitation to join the channel via your Reed email during the first week of classes.

Help. There are a number of resources you can access for help with this course's content. Everyone is welcome and encouraged to attend my office hours. I am also happy to arrange office hours by appointment; please use this link to schedule a time. Office hours are an opportunity to clarify difficult material and also delve deeper into topics that interest you. Please reach out to me if there are barriers preventing you from effectively utilizing this opportunity.

Our course assistant will run a two-hour problem session each week at a time and location TBD. The problem sessions will provide a structured, facilitated environment in which you can collaborate on homework. All students are encouraged to attend.

The Mathematics & Statistics Department also hosts drop-in tutoring on Sunday, Monday, Tuesday, Wednesday, and Thursday 19:00–21:00 in Lib 204. Upperclass tutors will be available to clarify concepts and help you with homework problems.

Finally, every Reed student is entitled to one hour of free individual tutoring per week. Use the tutoring app in IRIS to arrange to work with a student tutor.

Acknowledgments. Portions of this syllabus and course are based on the work of colleagues, especially Spencer Bagley, Angélica Osorno, and Dave Perkinson; I thank them warmly for sharing their materials and expertise.

Remember: *Math is hard, but we'll get through this together!*