

Instructor: Ravi Fernando, ravif@illinois.edu.

Lecture (G1H): MWF 2:00-2:50pm in 212 Davenport Hall

Office hours: to be announced on Canvas.

Course description: The goal of Math 347 is to introduce students to rigorous mathematical reasoning and proof-writing, and to study some of the fundamental structures that mathematicians are interested in. Topics include logic and the language of proofs, divisibility and congruence, sets and functions, mathematical induction, relations and equivalence relations, cardinality, and sequences of real numbers.

As you may be aware, Math 347 is currently being phased out and replaced with the large-lecture class Math 314; as a result, this honors lecture is the only Math 347 lecture being offered this semester. Math 347H is an accelerated version of the course which covers a few extra topics (such as order relations, Zorn's lemma, and the axiom of choice), covers some topics in more depth (such as modular arithmetic and prime numbers), and which will generally require you to develop a higher level of comfort with abstraction and fluency in writing proofs. On the flip side, Math 314 also covers some topics not covered in Math 347H. If you're unsure which of these courses is a better fit for you, I'd be happy to talk this over.

Textbook: The first three-fourths of the class will follow the free online textbook *An Introduction to Abstract Mathematics* by Donaldson and Pantano, in its entirety. **Important note:** we will use the January 21, 2020 edition, *not* the updated edition which is available on the authors' website. I have added a PDF of the book to the Files tab of Canvas; you can also buy it as a course reader from the bookstore for about \$13. The last fourth of the class will follow Lebl, *Basic Analysis I*, up to section 2.4; this is also freely available online. Finally, since this is the honors version of the class, I will sometimes cover material not discussed in the textbooks, and for these topics I will post some supplemental notes on Canvas in lieu of a textbook.

Grades: Your final numerical grade will be computed as follows:

- Final exam: 33%
- 3 midterm exams: 19% (best score) + 19% (middle score) + 10% (worst score)¹
- Homework: 19%

When assigning final letter grades, I will only curve up. Thus a cumulative average of 90% guarantees at least an A-, an 80% guarantees at least a B-, and so on.

Exams: We will have three in-class midterms on Friday, September 26; Friday, October 17;

¹Fine print: I will actually calculate your midterm average in two different ways: first, after normalizing each exam score against the class average, and second, using your raw scores. Since the midterms usually get harder from first to last, the first version gives a more meaningful indication of which exam scores are "better" and "worse", and I will use this version to set final letter grade cutoffs. The second version has the advantage of not depending on how your classmates do, and my promise to "only curve up" refers to this version.

and Wednesday, November 12. According to the university final exam schedule, our final exam will be on Tuesday, December 16, at 1:30-4:30pm. The final exam will be cumulative; midterms will not be cumulative except to the extent that mathematics is inherently cumulative.

Homework: Homework will typically be assigned every week. Each homework set will consist of about 8-9 problems, most of them requiring you to write proofs. Each week, only a subset of the problems will be graded in detail (based on both mathematical correctness and clarity of exposition); the others will be graded for completion.

Homework assignments will be posted to the Files tab of Canvas, and you will submit your completed homework on Gradescope (you should be added to the Gradescope course soon). You can submit your homework either as a PDF or as multiple pictures. To make the grader's job easier, I have a few formatting requests:

- If you are submitting pictures of your homework, please upload them in the correct order and orientation.
- If you do your homework on a tablet, please be sure to export it as a multi-page PDF, rather than a single long page (which is difficult for the grader to read).
- Regardless of the format, when Gradescope prompts you to do so, please indicate which problems appear on which pages of your submission. (You can mark a problem as appearing on multiple pages, or multiple problems as appearing on one page—so you don't need to think about this until you're submitting your work.)

Besides this, if you plan to continue in mathematics, it will very likely be to your advantage to become proficient in writing mathematics with \LaTeX (the typesetting software that I used to make this and other course documents). If you are interested, you can find a guide to getting started with \LaTeX in the Files tab of Canvas, filed under "Handouts".

Your lowest homework score will be dropped. Homework submitted late without a documented excuse will be graded with a 20% penalty per day late (rounded up to the nearest point), up to three days late.

Attendance and make-ups: It is expected that you will attend every class, unless you feel sick or have a similarly good excuse (athletic travel for UIUC, death in the family, religious observance, etc.) In these cases, your absence will be excused; I will make my lecture notes available so that you can see what you missed.

If you need to miss an exam (with a valid, documented excuse), contact me **as soon as possible**—preferably at least a week in advance of the exam in question. Most likely, I will address this by adjusting the weightings of your other exams, rather than giving a make-up.

Academic honesty: As always, you are expected to follow the UIUC student conduct code. All work on exams must be entirely your own, and any violations will be punished severely. As for the homework, since its main purpose is to give you practice, my primary concern is that

your brain is engaged with the full process of finding and writing proofs. Accordingly, you are allowed (even encouraged) to work on the homework in groups, but your final write-up must be your own.

Modern AI tools are capable of either augmenting your learning (e.g. getting additional explanations of concepts, provided that you do your due diligence to catch hallucinations) or replacing it (e.g. telling ChatGPT to do your homework for you). If you choose to use AI, make sure you do so in the pursuit of learning, not of taking the easy way out.

If you are unsure whether something is allowed, please ask.

Resources for students with disabilities: To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact me and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail disability@illinois.edu or go to the DRES website. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnose a previously undiagnosed disability by visiting the DRES website and selecting “Sign-Up for an Academic Screening” at the bottom of the page.

Mental health: Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University’s resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

Community of Care: As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or <https://odos.illinois.edu/community-of-care/referral/>). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe.

Further, as a Community of Care, we want to support you in your overall wellness. We know

that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the Student Assistance Center (SAC) in the Office of the Dean of Students for support and referrals to campus and/or community resources.