Math 347H - Fundamental Mathematics, Honors

University of Illinois at Urbana-Champaign

Spring 2021

Instructor:	Aron Heleodoro
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Lecture:	MWF 9:00-9:50 am (CST)
Grader:	TBD
Instructor Office Hours:	M 10-11 am or by appointment

Learning Goals:

- engage in active learning experience and learn how to read higher-level mathematical content;
- develop the skill to write mathematical proofs;
- experience a bit of the flavor of proofs in different areas of mathematics by learning some of their basic concepts;
- achieve a solid mastering of writing proofs that will allow you to excel in more advanced mathematics classes (e.g. Elementary Real Analysis (Math 444) and Introduction to Abstract Algebra (Math 417));

Objectives: The main goal of this class is for students to develop the skill of writing proofs. The only way to learn this skill is through practice. The mathematical content that we will use for this purpose is the following:

1) sets, equivalence relations, and construction of rational numbers;
2) functions, Schröder–Bernstein Theorem, and axiom of choice;
3) least upper bound property, construction of real numbers, and commutative rings;
4) construction of the complex numbers, properties of the real numbers, integral domains, and polynomial rings;
5) introduction to linear algebra, point set topology, and metric spaces.

Structure: This is an online class with synchronous Zoom meetings (accessible via Moodle) at MWF 9:00-9:50 am (CST). The meetings will be a mix of traditional lectures (roughtly 2/3 of the time) and discussion sections (roughly 1/3 of the time). The schedule and all course material will be available on Moodle.

Recording of lectures: to accommodate students that miss the meeting, I will record the lectures (but not the discussion sections). At the beginning of the lecture I will remind you before I start recording, but in case I forget you should assume that this is the case for the lectures.

Textbook: *Tools of the trade: An Introduction to Advanced Mathematics*, by Paul J. Sally, Jr. You can get a copy from the library here.

Platforms:

- Moodle will be used to access the Zoom sections and see your grades.
- Perusall will be used as platform to read the textbook together and have discussions about it.
- Gradescope will be used to submit your assignments (Homework and Exams).
- Campuswire will be used to communicate about the material.

Participation:

As this is an online course, and we are all trying to make it through a worldwide pandemic, we might struggle to bridge the physical distance between us all. Nevertheless, let us attempt to build personal connections and try to create a sense of community in our course. One way that we will try to do this is by using Campuswire to communicate.

My intention is for you to use this to ask questions related to the material, answer polls, and use chat-rooms to discuss the material and study together. One feature to notice is that you can create private chat-rooms and invite only certain people, so it works to form study groups.

Disclaimer: This is my first time using this platform, hopefully it will be more useful than a hindrance.

Assessments:

- **Participation. (10 %)** *Discussion sections, quizzes and reading assignments.* You are expected to come to the sections where we discuss problems, answer quizzes and do the reading assignments in time. Details about the specific grading of this category will be given later.
- **Homework. (50 %)** *Every two weeks.* These should be neatly written and turned in on time. For every 24-hour period that the homework is late you will lose 5 % of the grade and I publish the solutions (roughly one week after) the homework won't be accepted. The first 24-hours after the deadline are a grace period, but turning it after 24-hours will take 10 % off your homework. I will drop your worst grade from all the homework assignments.
- **Midterms. (20 %)** *We will have two midterms.* You will have a 24-hour window to access and complete the test, and once you log in you will have two hours to solve it.

  Mark your calendar: **Mar. 1** and **April. 12**.
- **Final. (20 %)** *This is a three-hour exam, which covers the material of the whole course.* You will have a 24-hour window to access the final exam and once you log in you will have three hours to solve it.

  Mark your calendar: **May. 13**.

No make-up exams. Rubrics for the specific assignments will be presented later.

Class Policy:

- Zoom etiquette is important when you attend discussion sections, meetings and office hours. Please be respectful of everyone present. Muting your audio when not talking can be a good way to minimize

noise, when a lot of people are in the meeting. We understand that you might have privacy concerns regarding video on Zoom, so we encourage you to explore Zoom backgrounds and/or profile pictures for your account. This helps your instructor, TAs and fellow classmates a bit, as it can be very hard conversing with empty squares on a screen.

- You are expected to turn in all the assignments. Late submission will affect the grade, unless it is justified.
- If you require accommodations, please don't hesitate and reach out as soon as possible, so we can make sure the course works for everyone from day one! For more information see the University Policy below.
- Communication is key. The world has been feeling overwhelming and scary lately, and we understand it. If you are struggling, please communicate with your TA and instructor. We want you to succeed, but we can do that only if you let us know. We are a team, so please don't be afraid to reach out!

University Policy:

- This class is subject to all the rules specified in the university policy and in particular to the Mathematics department policies. You can find the relevant information in the following link: https://math.illinois.edu/resources/department-resources/teaching-policies.
- Students that need special accommodations need to have a letter from the Disabilities Resources and Educational Services. For more information see the website: http://www.disability.illinois.edu.
- Students are required to abide by the University of Illinois's academic integrity policy, which can be found at: http://studentcode.illinois.edu/.
  Suspected violations of academic integrity will be reported to the Dean's Office and will likely result in a failing grade in the class and a note in your academic record.
- As any other university obligation this class does not take precedent over the students well-being and health. The university has great resources for anyone in need, more information can be found on: http://odos.illinois.edu/community-of-care/.