Foundations of Higher Mathematics
Math 310
Fall 2024

Instructor

Dr. Seth Harris
Hall of Sciences 302
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Class Meetings

Monday, Wednesday, Friday 9:10 AM – 10:15 AM
Brothers College 215

Zoom (when necessary)

When necessary, we will hold class online on Zoom. All Zoom meetings will be recorded.

Zoom link: https://drew.zoom.us/s/873663190

Meeting ID: 873 663 190

Likely dates for Zoom classes: Wednesday, September 11; Friday, September 13; Monday, November 25 (just before Thanksgiving)

Office Hours

Monday 1:15 PM – 2:30 PM
Tuesday 10:30 AM – 11:45 AM
Wednesday 10:30 AM – 11:30 AM
or by appointment

Office hours will typically be held in person whenever Drew classes are meeting in person. However, you may always request to meet online during these times. Occasionally I will hold office hours online only.

Office hour Zoom link: https://drew.zoom.us/s/284748767

Office hour meeting ID: 284 748 767

Textbook and Course Outline

Book of Proof, 3rd Edition, by Richard Hammack

Chapters 1–2: Review of Sets and Logic
Chapters 4–9: Proof Techniques
Chapter 10: Mathematical Induction
Chapter 11: Relations
Chapter 12: Functions
Chapter 14: Cardinality
Additional topics?

Our goal is to cover all of these chapters, or at least the fundamental concepts of each chapter. We will skip Chapters 3 and 13.

Our textbook is available at the Drew bookstore and also is available ***free-of-charge online*** at the following address:

https://richardhammack.github.io/BookOfProof/

Course Description

Develops the key tool of mathematical knowledge: proofs. Using examples in logic, set theory, number systems, integers, rational, irrational, real, and complex numbers, countability and uncountability, primes and divisibility. Focuses on understanding and applying definitions and theorems, recognizing and constructing valid arguments, and communicating mathematical ideas both orally and in writing.

Prerequisites

Math 151: Calculus II and Math 220: Discrete Mathematics

Grading

30% Homework
17% Midterm Exam 1, Wednesday, October 2
17% Midterm Exam 2, Friday, November 8
28% Final Exam, Wednesday, December 11
8% Class participation

Homework

Homework will be assigned most weeks, and you will generally be given one week to complete it. You are encouraged to work in groups, but each student must turn in their own work. You will be allowed to turn in at most two homework assignments late. Any late assignment is due at the beginning of the next class, and you need not give any explanation to your instructor regarding why it was late.

Your homework grade will be based on your reasoning as well as the written communication of your results. Learning how to write clear, precise, mathematical proofs is a skill that we will develop throughout Math 310, and one that will be crucial for most other upper-level math courses.

Exams

There will be two in-class midterm exams on Wednesday, October 2 and Friday, November 8. The final exam will likely have both an in-class portion and a take-home portion. The in-class final exam is currently scheduled for Wednesday, December 11 from 8:30–11:30 AM.

If you are unable to make an exam, it is your responsibility to notify your instructor at least 24 hours prior to the exam and arrange a make-up time. If you miss an exam without doing so, a make-up exam will NOT be allowed, unless you have a valid absence verification from the CAE.

LaTeX

We will be using LaTeX, also known as simply TeX. Invented by Donald Knuth in the 1980's, LaTeX is the current standard program for typesetting papers in mathematics and computer science. This syllabus is written in LaTeX. Throughout the course, we will gradually learn the basics of LaTeX, and I will give you some practice assignments. You will be required to write at least two homework assignments entirely in LaTeX. My hope is that once you have had some practice TeXing, you will find it to be much easier for writing mathematics than say, Microsoft Word, not to mention that the end result always looks much nicer.

Attendance

We expect that you will attend class every day. Repeated absences will negatively affect your mathematical understanding and, ultimately, your final grade. Regular attendance will enhance your comprehension of mathematical concepts, and will help you solving your homework and being productive on exams.

Student Learning Outcomes

During this course, students will:

- Appreciate the importance of *definitions* in mathematics
- Use analytical and critical thinking to clearly determine what a mathematical statement says—namely, what it takes as given, and what it claims is true as its conclusion
- Use the basics of logic and set theory, as well as analytical and critical thinking, to clearly recognize and construct sound mathematical arguments of the following types: direct proof, proof by contrapositive, proof by contradiction, proof by induction, proof by cases, disproof by counterexample
- Summarize and synthesize ideas and information from source materials;
- Communicate mathematical ideas through appropriate exposition using the style and conventions of the discipline;
- Communicate mathematical ideas orally both in informal (as in group work with other students) and formal (as in a formal presentation) settings.
- Learn how to typeset mathematics using the LaTeX language, the typesetting language most frequently used in mathematical research

Academic Integrity

All students are required to uphold the highest academic standards. Any case of academic dishonesty will be dealt with according to the guidelines and procedures outlined in Drew University's Standards of Academic Integrity: Guidelines and Principles, which is located in the academic policies section of the catalog.

Absence Policy Statement

In addition to the course attendance policy, students should be aware of their rights and responsibilities regarding absences for legitimate reasons as described in the Absence Policy: Student Rights and Responsibilities, which is located in the academic policies section of Drew's course catalog. Legitimate planned absences may include religious holidays, NCAA-sanctioned competition, academic conference or some Drew-sanctioned events. Students need to inform the faculty member of planned absences in the first week of the semester. For unforeseen extended health issues please see the academic accommodations statement.

Academic Accommodations

Your experience in this class is important to me. If you have already established accommodations with the Office of Accessibility Resources (OAR), please provide me with a copy of your accommodation letter at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through the Office of Accessibility Resources (OAR), but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to: mental health, attention-related, learning, vision, hearing, physical or health impacts), you are encouraged to contact OAR. OAR offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions.

Although a disclosure may take place at any time during the semester, students are encouraged to do so early in the semester, because, in general, accommodations are not implemented retroactively.

Office of Accessibility Resources contact information:
Director: Dana Giroux
Location: Brothers College, Room 119B
Phone: 973-408-3962
Email: dgiroux@drew.edu, disabilityserv@drew.edu

Final Exam Policy Statement

If extenuating circumstances occur, students may submit a Final Exam Reschedule request for review by the Associate Provost. Students may not negotiate a make-up date directly with the course instructor. Students may request to reschedule an exam under the following circumstances:

1. Two final exams scheduled at the same time;
2. Three finals are scheduled in one calendar day; one of the exams will be rescheduled at the convenience of the instructor and the student;
3. Serious illness, or personal emergency; the student is required to present documentation to validate.

The final exam schedule is visible on the Registrar's website by the beginning of each semester. Students are expected to schedule travel plans for AFTER their final exams.