Mathematics 220

Mathematical Proof

Summer 2025 (2025S1)

Acknowledgement

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xʷməθkʷəy̓əm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on in their culture, history, and traditions from one generation to the next.

Course information

An introduction to standard techniques of mathematical proof.

Instructor

- Andrew Rechnitzer
- All classes in LSK-201
- Tuesday, Thursday, Friday 11-12:50
- Wednesday 11-11:50

Important term dates

- First day of teaching: Tuesday May 13
- Last day of teaching: Thursday June 19
- Summer Term 1 Exam period: Monday June 23 to Friday June 27

Course webpage

- course webpage

Prerequisites

- a score of 64% or higher in one of MATH 101, MATH 103, MATH 105, SCIE 001, or
- one of MATH 121, MATH 200, MATH 217, MATH 226, MATH 253, MATH 254.

Topics

The course will cover (approximately)

- Sets
- Basic logic
- Direct and contrapositive proofs
- Quantifiers
- Induction
- More sets
- Equivalence relations
- Functions
- Proof by contradiction
- Cardinality and infinite sets

Throughout the term we will emphasise both the mathematical correctness, and also the importance of clarity of presentation of mathematics.

Text

- The course will follow PLP - An introduction to mathematical proof by Demirbas and Rechnitzer - with exercises contributed by Kohut and Trainor.
- It is a free online text (which you can also download as PDF if you want).
- It was developed at UBC for this course and was partially funded by UBC's OER fund
- You can even look at the source code if you want.
- The text also has links to set of short video lectures, slides and worksheets
- We also recommend the book of proof by Richard Hammack - it is also free to download.

Assessment

Breakdown of marks

- 10% Homework - two each week
- 10% Participation
- 20% Midterm - in class on Wednesday of Week 4
- 60% Exam - in the end-of-June exam period

Videos

- *Before* you come to class you should watch some videos on the material - we'll tell you which ones.

- You can find all the videos in a big list here.
- The slides from the videos are also there.

Participation

- You will need to bring paper and a pen or pencil to class --- you will need to work on problems during class.
- In most classes I will ask you to hand in a **small** piece of work
- It will generally be something quite small like "What is the definition of surjective" or "Give an example of a reflexive relation."
- I expect there to be at most 20 such submissions. You can miss 3 without penalty, but beyond that each missed submission will result in a loss of 1 mark. Missing 13 or more submissions will result in a mark of zero for this component of your grade.
- Your submissions will be marked for participation (though there must be some evidence of effort).

Homework

- See the Canvas page for details
- We will give around 12 homework assignments - starting from the very first week!
- There will be two homework each week - one due on Thursday and the other on Sunday (before 11:59pm)
- I will try to post all homeworks well in advance.
- We will not accept late homework.
- There will be no "make up" homeworks.
- Instead your homework score will be taken from your best 8 homework assignments.
- Note that if you miss a significant number of homework assignments due to valid reasons then part of the weight of the homework will be put onto the exam.

Presentation of homework

- One of the main goals of mathematics 220 is to teach how to present and communicate mathematics precisely and correctly.
- Accordingly handwritten or messy homework will not be accepted.
- **Homework must be typeset and submitted as a PDF through Canvas**.
- We recommend that you use latex to prepare your homework
- If you don't know how to use LaTeX, we will provide you with some basic templates to get you started
- We recommend using Overleaf (which you can do free of charge) or (if you feel up to the challenge) installing it on your own computer.

Use of AI

- Learning to think critically is an important goal of this course.
- As such, you are expected to come up with your own ideas, alone or working with other students, without looking up answers online.
- The use of AI tools, including ChatGPT and similar tools, to complete or support the completion of any assignment in this course is not allowed, and would be considered academic misconduct.
- Supplementing your own learning by the use of tools after you have completed a question is fine.

Midterm - June 4

- The midterm will be in regular class time on the Wednesday of Week 4.
- See the course webpage for details closer to the date.
- Note - there is no "make up" midterm - if you miss the midterm due to valid reasons, the weight of the midterm is passed onto the exam.

Exam

- See the course webpage for details closer to the end of term.

General syllabus information

The Mathematics Department has standard syllabus information. This includes standardised policies for

- academic concessions (ie missed homework + midterm)
- academic integrity (ie cheating)
- registration issues (your instructors have no control over anything to do with registration)
- misc student resources

You can find that information here