Mathematics 220-203* — mathematical proof

*Section for CPEN students only.

Lecture times + locations

- Monday, Wednesday, Friday 13:00–14:00 in Woodward room 6.

Lecturer — Andrew Rechnitzer

- Mathematics 215.
- Email — `andrewr@math.ubc.ca`
- Office hours TBA

The best way to contact me is either

- talk to me at the end of the lecture (please not immediately before the lecture)
- send me an email with "maths220" or "math220" in the subject line.

Course webpage

- Under construction but coming soon.

Assessment

- Homework assignments — 10%
- Single midterm test — 30%
- Final exam — 60%

Textbook

Chartrand, Polimeni and Zhang: *Mathematical proofs — a transition to advanced mathematics*, 2nd or 3rd edition.

Homework

Homework assignments will be due every week at the *beginning* of the Monday lecture. Since one of the main aims of the course is to learn how to present mathematics clearly, all homework assignments will need to be type-set (using LaTeX or similar). I will provide more details about this at the start of term.

Midterm and Final

The dates for the midterm test and final exam are yet to be determined. That being said, the midterm will most likely be in the week before the midterm break, so around February 10–14. The date of the final exam will be announced later in the term, but could be anywhere between April 12–30 (according to the UBC calendar).

Both the midterm and the final will be closed-book exams; no formula sheets, calculators or other assistance will be allowed — definitely no phones (smart or otherwise).

Missed assessment

Missing the midterm or handing in homework after the deadline will result in a mark of 0. There are only 2 possible exceptions to this rule

- prior notice of a valid, documented absence (e.g. out-of-town varsity athletic commitment) on the scheduled date; or
- notification to the instructor within 72 hours of absence due to medical condition.

In both cases original written documentation is requried — eg a letter from your coach or a doctor's note. Please do not eat leftover sushi before your midterm or final. It is surprising how many students become ill because of this.

Course outline

The main aim of the course is to learn how to write clear and correct mathematical proofs. Additionally we will put these proof skills to work in a variety of

A list of core topics includes

- Sets — definitions and set operations.
- Logic — statements, logical connectives and quantifiers
- Direct and contrapositive proofs
- Proof by contradiction
- Equivalence relations
- Functions — injections, surjections, bijections.
- Cardinality — countable and uncountable. Diagonal argument.
- Induction

Then we will go on to apply these to

- Elementary combinatorics — basic rules of counting, combinations and binomial theorem, recursive counting.
- Graphs and trees — definitions, handshaking theorem, isomorphism and planarity, graph representations, DAGs, spanning trees, Eulerian and Hamiltonian tours.