Mathematics 220 (Mathematical Proof), Winter/Spring 2015

Lecture times and locations:

- Section 201: Prof. M. Khosravi, Tue Thu 11:00-12:30, MATX 1100
- Section 202: Prof. I. Laba, Tue Thu 14:00-15:30, LSK 460
- Section 203: Prof. A. Rechnitzer, MWF 12:00-12:50, LSK 201 (CPEN student section)

Lecturer: Prof. M. Khosravi (Section 201)

- Math Bldg 219, (604) 822 2615, khosravi@math.ubc.ca
- Office hours: TBA

Lecturer: Prof. I. Laba (Section 202)

- Math Bldg 200, (604) 822 4457, ilaba@math.ubc.ca
- Office hours: TBA

Lecturer: Prof. A. Rechnitzer (Section 203)

- Math Bldg 215, (604) 822 4516, andrewr@math.ubc.ca
- Office hours: TBA

The best way to contact instructors is by email. Please note that email received on evenings and weekends will be answered on the next business day. If you cannot attend regular office hours due to schedule conflict, please make an appointment in advance. Drop-ins and same-day requests for appointments cannot always be accommodated.

Prerequisites: Either (a) a score of 64% or higher in one of MATH 101, MATH 103, MATH 105, SCIE 001 or (b) one of MATH 121, MATH 200, MATH 217, MATH 226, MATH 253, MATH 263.

Course web pages:

- Sections 201 and 202: http://www.math.ubc.ca/~ilaba/teaching/math220_S2015 (this one).
- Section 203 (CPEN section): http://www.math.ubc.ca/~andrewr/maths220_cpen/maths220.html Please note that this section will follow a slightly different syllabus and have a different assessment and grading scheme.

Information for Sections 201 and 202:

Textbook: Gary Chartrand, Albert D. Polimeni and Ping Zhang: "Mathematical Proofs - A Transition to Advanced Mathematics", 3rd ed., Pearson / Addison Wesley, 2013. ISBN 978-0-321-79709-4. Please that homework problems will be assigned from the 3rd edition of the book.

Course goals: To learn how to construct and write mathematical proofs, with strong emphasis on clarity and mathematical rigour. Specific topics will include:

- Sets: definitions, set operations (Chapter 1)
- Logic: logical connectives, quantifiers (Chapter 2)
- Proofs: direct and contrapositive (Chapters 3 and 4)
- Proofs: existence and contradiction (Chapter 5)
- Induction (Chapter 6)
- Equivalence relations (if time allows; Chapter 8)
- Functions: injective, surjective, bijective, inverses and compositions (Chapter 9)
- Cardinality of sets: finite sets and different types of infinite sets (Chapter 10)
- Elementary real analysis - limits of sequences and series, concept of supremums (if time allows; Chapter 12)

This list is somewhat provisional and may be adjusted as needed.

Your course mark will be based on homework (15%), the midterm exam (35%), and the final exam (50%). The grades may be **slightly** scaled at the end of the course.

Examinations: There will be one in-class 80-minute midterm scheduled in class on February 24, and a 2.5 hour final exam in April. The date of the final examination will be announced by the Registar later in the term. Attendance at the final examination is required, so be careful about making other committments (such as travel) before this date is confirmed. All examinations will be strictly closed-book: no formula sheets, calculators, or other aids will be allowed.

Homeworks: There will be 7 homework assigmnents, due tentatively on January 13, January 22, February 3, Februaty 12, March 5, March 17, and March 27. Each homework will be announced and posted here at least a week in advance. The homeworks are to be handed in at the **beginning** of class. If you cannot come to class, you may drop off your homework at your instructor's office prior to the start of class. Late assignments will not be accepted. Solutions will be posted on the course webpage immediately after the lectures. To allow for minor illnesses and other emergencies, the lowest homework score will be dropped.

Homework assignments will be posted here.

Academic concession: Missing the midterm, or handing in a homework after the deadline, will result in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor, or a **documented** medical reason. Your course mark will then be based on your remaining coursework.

Additional course related resources:

- Tim Gowers has a series of blog posts on mathematical logic. Highly recommended as supplementary reading for Chapter 2. (Update: the link has been fixed to point only to the subcategory of posts on logic, not to the larger "teaching" category.) See in particular:
  - An introductory post on studying mathematics
  - Basic logic - connectives - NOT (negation)
  - Basic logic - connectives - AND and OR
- Robert Talbert's videos on set theory, logic and proof techniques. They are paired with a different textbook, but cover roughly the same material as this course and are identified by topic, so you should have no trouble finding the videos you need.
- "Dangerous Knowledge", a BBC documentary featuring the mathematicians Georg Cantor, Ludwig Boltzmann, Kurt Godel, and Alan Turing. The first part talks about Cantor and his discovery of infinities of different sizes, something that we plan to cover near the end of the course. The documentary is a bit overwrought and sensationalized at times, but it does a good job conveying

both the general thrust of Cantor's work and the impact it had on the development of mathematics.

General links:

- Please read the UBC policy on Student Conduct and Discipline.
- Mathematics Learning Centre: The Math Department runs a drop-in tutorial centre for undergraduate Math courses, staffed by Graduate Teaching Assistants. This centre is located in Rooms 300, 301, and 302 in the Leonard S. Klinck (LSK) Building, and is open Monday through Friday, 9:00am to 7:00pm. Check the website above for any changes to hours and announcements. All tutors provide assistance with first- and second-year calculus and linear algebra and will attempt to help with any undergraduate Math course. In addition to regular assistance, the MLC offers Quick Help for students who are looking for fast support for minor snags. There is no charge for the services MLC provides.
- Past final exam database
- UBC Math Club, located in Math Annex 1119, sells math exam packages (old exams together with solution sets) for a nominal price before each final exam session.

[Mathematics Department] [University of British Columbia]