

MAST 217
Introduction to Mathematical Thinking
Winter 2025

- Instructor:** Dr. M. Ntekoume
Email: maria.ntekoume@concordia.ca
- Class Schedule:** Tuesdays & Thursdays, 11:45 am – 1:00 pm.
Note: There will be a mid-term break from February 24 to March 2.
- Office Hours:** TBA.
- Course Objectives:** This course is meant primarily for students who intend to pursue some concentration in mathematics or statistics at the university level.
- The course aims to introduce students to some of the “tools of the trade” of the mathematician. Many courses present results of mathematicians’ work; what we call “mathematical results.” In this course, we will focus on *how* mathematicians arrive at these results. We will consider processes such as exploring, defining, conjecturing, solving, and proving. With an emphasis on mathematical proof, the course aims to lay a foundation to assist students in all other university-level mathematics courses.
- List of Topics:** Some of the ideas that we will discuss include: the logical structure and language of mathematical statements, the difference between mathematical and everyday styles of argumentation, what mathematical proofs are, the roles of definitions, assumptions, examples and counterexamples in mathematical proofs, and different mathematical proof methods.
- To illustrate these ideas, we will consider some mathematics that is based on content that should be familiar to students (such as elementary notions about the real number system, sets, and functions), as well as some mathematics that students may not be familiar with (such as the notion of cardinality).
- Required Textbook:** *How to Prove It: A Structured Approach*, by Daniel J. Velleman, Cambridge University Press, 3rd Edition.
The textbook will be available at
<https://www.bkstr.com/concordiastore/home>
Note: Students should order textbooks as early as possible, especially for printed versions in case books are backordered or there are any shipping delays.

Other Texts: *The Foundations of Mathematics*, by Ian Stewart and David Tall, Oxford University Press, 2nd Edition.

Introduction to Mathematical Thinking: MAST 217 Notes, by Drs. J. Hillel, W.P. Byers, A. Sierpinska, & H. Proppe.

Mathematical Reasoning: Writing and Proof, by T. Sundstrom, Version 3.

An Introduction to Proof via Inquiry-Based Learning, by D.C. Ernst.

Evaluation: The following grading scheme will be used:

- Assignments: 20%
- Quizzes: 10%
- Midterm: 20%
- Final Examination: 40%
- Proof Portfolio: 10%

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

NOTE: If you are unable to write the midterm test for a valid reason, you must request to move the weight of the midterm to the final exam. Such a request will not be granted unless it is made in writing (by email), the reason is valid, and is supported by documentation or other evidence. Valid reasons for missing a midterm test include: conflicts with other exams or religious observances (must be reported to the instructor in advance); illness (Short-Term Absence form or valid medical note required); bereavement.

THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE.

Assignments: Homework will be assigned once a week, posted on Moodle. The solutions must adhere to the writing guidelines posted on Moodle and should be submitted electronically as a single pdf file on Moodle by the due date. Students are expected to stay informed of when each assignment is due. **Late assignments will not be accepted for any reason.** Instead, each student can request one 2-day extension for an assignment once in the semester. This request must be communicated to the instructor in writing at least a day before the assignment is due. This extension is intended to help with issues such as minor illness, a very busy week etc. If there is a larger issue that prevents you from doing your best work in this class, please talk to your instructor.

A reasonable and representative subset of each assignment will be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Collaboration on homework assignments is allowed and encouraged. However, the work you submit must be written by you, in your own words and your own writing style. The loaning or copying of solutions from any source is strictly forbidden.

Understanding all homework problems and being able to produce clear and precise solutions is essential to succeed in the course.

Quizzes: Timed quizzes will be administered on Moodle approximately every week. Late submissions will not be accepted. However, students will have an opportunity to retake quizzes they missed or on which they want to improve their score during the week before the midterm and the final exam.

Midterm Exam: There will be an in-class test in week 6 or 7. The exact date of the exam will be announced in class at least a week in advance.

Final Exam: The final examination will be a 3-hour long exam, scheduled by the Examinations Office. To obtain a good grade students must demonstrate a thorough understanding of the topics covered and good problem-solving and proof-writing skills.

NOTE: Students are responsible for finding out the date, time, and location of the final exam once the schedule is posted by the Examinations Office. Conflicts or problems with the scheduling of the final exam must be reported directly to the Examinations Office. It is the Department's policy and the Examinations Office's policy that students are to be available until the end of the final exam period. Conflicts due to travel plans cannot be accommodated.

Proof Portfolio: Students will work throughout the semester to compile a portfolio of proofs representing the work they have produced in the course and showcasing the growth of their proof-writing skills. Guidelines on the composition of the portfolio will be available on Moodle. The final submission of the proof portfolio will be at the end of Week 10.

Grading policies: Late submissions are not accepted and will not be graded.

Students are responsible for making sure their submissions are clear and legible. The graders reserve the right to not grade submissions that are, in their view, illegible.

All grading disputes must be brought to the attention of the instructor within a week of the graded assignment or test being returned.

Communication: Communication between the students and the instructor will take place in person and online via lectures, Zoom meetings, Moodle announcements, and email messages. **Students are responsible for reading and taking note of all electronic communication from the instructor and the University.**

Students are expected to attend the lectures unless unforeseen circumstances arise. If for some serious reason you have to miss multiple lectures or exams, you should inform the instructor as soon as possible so we can plan for the best way to help you stay on track.

Your active participation in the classroom is highly encouraged and will always be welcome. Please don't hesitate to ask questions!

Students should regularly monitor the course website on Moodle for announcements regarding the course; all important communication will be made available there.

The office hours will be decided taking students' availability into consideration, so please fill out the relevant survey. Finding times that work for everyone is a difficult (if not impossible) task, but I will do my best to make my office hours accessible to as many students as possible.

You should also feel free to email me for any pressing questions or if you cannot make it to office hours that week. I usually reply within a day during the week. I will also be available to meet by appointment, either in person or on Zoom.

I encourage you to make use of these opportunities to discuss the material with me and your classmates. I expect you to invest a lot of time and energy into this course, but I am committed to helping you learn and enjoy the material and will do my best to help you succeed.

Student Services

You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: <https://www.concordia.ca/students/services.html>

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: <https://www.concordia.ca/conduct/academic-integrity.html>" [*Undergraduate Calendar, Sec 17.10.2*]

Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the [Code of Rights and Responsibilities](#) which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in

University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property

Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the [Academic Code of Conduct](#) and/or the [Code of Rights and Responsibilities](#). As specified in the [Policy on Intellectual Property](#), the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the [Academic Regulations](#) the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.