DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus (Section A)

MATH 2110 - Logic and Set Theory, Fall 2023

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.

Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

Instructor: Prof. Peter Selinger
Email: selinger@dal.ca (please mention "2110" on the subject line)

Lectures: TRF 9:35–10:25, Chase 319

Office hours: Thursdays 11–12, Chase 303

Course delivery: In-person.

Course Description

This course is an introduction to the foundations of modern mathematics, including basic set theory, proof techniques, and programming. Topics include: set-theoretic encoding of mathematical entities: tuples, relations, numbers, sequences, families; set comprehension; cardinality; sets and classes; proof techniques; existential and universal quantifiers; induction; proof by contradiction; programming as a tool for problem solving.

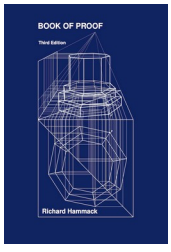
Course Prerequisites: None

Course Exclusion: Math 2112

Learning Objectives

Until now, your mathematics education has probably been mostly about computing the answers to questions: solve an equation, find a determinant, compute a derivative. You have seen theorems (for example, the fundamental theorem of calculus), but the focus was usually on using these theorems to solve problems (for example, compute an integral). As you move into more advanced mathematics, other aspects of the subject will become more and more important: proving theorems, making definitions, and discovering new facts and methods. This course introduces you to the two pillars of mathematics: logic and set theory. You will learn to recognize correct proofs, and write correct proofs and definitions. You will also learn to use computers as a tool for discovery and problem solving, via the Python programming language.

Course Materials



- *Textbook: "Book of Proof", 3rd edition, by Richard Hammack, 2018. This book is freely available online at https://www.people.vcu.edu/~rhammack/BookOfProof/, or you can purchase an inexpensive hardcopy from Amazon.*
- *Course website on Brightspace is accessed through dal.brightspace.com.*

Course Assessment

Participation	*5%*	*Participation in class, office hours, or discussion forums.*
Homework	*20%*	*Assigned throughout the semester, to be handed in on Brightspace.*
Midterm 1	*15%*	*Friday, September 29 in class.*
Midterm 2	*15%*	*Friday, November 3 in class.*
Final Exam	*45%*	*Scheduled by the Registrar's Office*

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The homework will also include programming projects. You'll need access to a computer capable of running Python and Jupyter Notebooks.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	**B+** (77-79)	**C+** (65-69)	**D**	(50-54)
A (85-89)	**B** (73-76)	**C** (60-64)	**F**	(<50)
A- (80-84)	**B-** (70-72)	**C-** (55-59)		

University Policies and Statements

See Brightspace for "University Policies and Statements" and "Student Resources and Support".

Course Policies

1. The Mathematics Learning Centre is a great study space. It is located in Room 119 on the 1st floor of the Chase Building, and will be operating in-person and remotely. Tutors are available M-F 11:30-4:30 (in-person) and M-F 6:30-7:30pm (remotely) on a first come, first served basis, free of charge. Specific support for Math 2110 is available M 12:30-4:30, T 11:30-4:30, Th 11:30-2:30 (in-person) and MTF 6:30-7:30 (remote). Register for the Brightspace "course" at https://www.dal.ca/faculty/science/math-stats/about/learning-centre.html to access the online support. The Learning Centre also has large tables where you can work together.
2. Calculators, textbooks, and notes are not permitted for Midterm Tests or the Final Exam.
3. Late homework will not be accepted except with the instructor's prior permission.
4. A missed midterm cannot be written at another time. If you miss the midterm without prior permission, then it will count as a 0. Exceptions are made in two cases: (1) if you obtain the instructor's prior permission to miss a midterm, or (2) if you have an officially valid excuse such as a medical doctor's note. In these cases, the weight of the missed midterm will be shifted to the final exam (e.g., the final exam will then count 60% instead of 45%). There is no make-up option for the final exam except in cases of an officially valid excuse such as a medical doctor's note.
5. Student Declaration of Absence forms can be used for missed homework, but not exams. You can use up to 2 Student Declaration of Absence forms in this course.
6. Students are encouraged to study in groups, but each student must complete their own individual homework and exams. Homework must be written in your own words.
7. You are not permitted to copy answers from the internet or to ask anybody on the internet for help with your homework, including programming assignments. You may not use artificial intelligences to help with your homework. We may use plagiarism software and other technological means to detect academic integrity issues.
8. 5% of your grade are for participation. There are at least three ways to participate: you can ask or answer a question in class; you can ask or answer a question in office hours; or you can ask or answer a question in the Brightspace discussion forum. Each time you do so, you receive 1 participation point, up to a maximum of 5 points. 5 points equals 5%. I reserve the right to not award points in case of frivolous activity (e.g.: don't ask what is 1+1; don't ask questions you already know the answer to; don't answer your own question just to get a point; don't conspire to answer a friend's question just to get a point, etc. The point is participation).

Course Content

We will cover most of Chapters 1-8, and a selection of topics from Chapters 10-12, and 14 of the textbook, as well as the system of Natural Deduction and some Python programming.