

Mathematics 2200H – Mathematical Reasoning

[Last modified 2017.08.28.]

TRENT UNIVERSITY, Fall 2017

[In Peterborough!]

Instructor

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Department of Mathematics

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Prerequisite

MATH 1120H (or 1100Y or 1101Y) or 1350H.

Text

A Gentle Introduction to the Art of Mathematics, Version 3.1, by Joseph Fields. There will also be occasional handouts augmenting the text. The text is freely redistributable under the terms of the *GNU Free Documentation License*; a pdf copy may be downloaded from:

euclid.trentu.ca/math/sb/2200H/Fall-2017/GIAM.pdf

Meetings

Lectures: Tuesday 12:00-12:50, Wednesday 11:00-11:50, & Thursday 10:00-10:50, all in GCS 103.
Seminars: Friday 10:00-10:50 in GCS 108.

Marking Scheme

There will be at least eleven weekly assignments and a take-home final examination. The best ten assignments will each count for 6.5% of the final mark and the final exam will count for the remaining 35%. Note that more 25% of the course marks will be obtained by the final date (Tuesday, 8 November) to withdraw from Fall half-courses without academic penalty. Assignments will not normally be accepted after the due date; students unable to hand them in on time for reasons beyond their control should contact the instructor as soon as possible. This scheme may be modified in *exceptional* circumstances, such as a lengthy absence due to illness. Any such modification will require the agreement of both the student and the instructor.

Learning Outcomes

This course is an introduction to the basics of doing mathematical proofs while acquiring familiarity with a number of basic concepts, drawn from logic, set theory, number theory, and combinatorics, which are used in many mathematical fields. Successful students finishing the course should be able to solve problems using the methods developed in the course, read and write mathematics effectively using appropriate notation, and formulate and write logically correct proofs.

Schedule

Please note that where the material covered is concerned this schedule is a polite fiction: no lesson plan survives contact with actual students unchanged!

Week 0. (7–8 September) Organizational lecture. No seminar this week. Classes begin Thursday, 7 September.

Week 1. (11–15 September) Analyzing problems, problem-solving strategies, logic. Assignment #1 due on Thursday, 14 September.

Week 2. (18–22 September) Propositional logic, deductions. Assignment #2 due on Thursday, 21 September.

Week 3. (25–29 September) Basic set theory, functions. Assignment #3 due on Thursday, 28 September.

Week 4. (2–6 October) First-order logic: relations and quantifiers. Assignment #4 due on Thursday, 5 October.

Week 5. (9–13 October) Sets, relations, and functions. Assignment #5 due on Thursday, 12 October. No classes on Thanksgiving Day, Monday, 9 October.

Week 6. (16–20 October) Direct and indirect proof techniques. Assignment #6 due on Thursday, 19 October.

Fall Reading Week. (23–27 October) Enjoy!

Week 7. (30 October – 3 November) Equivalence relations, definition of integers and rationals. Assignment #7 due on Thursday, 2 November.

Week 8. (6–10 November.) Real and complex numbers. Assignment #8 due on Thursday, 9 November. The last date to drop Fall half-courses without academic penalty is Tuesday, 7 November.

Week 9. (13–17 November) Mathematical induction, division and Euclidean algorithms. Assignment #9 due on Thursday, 16 November.

Week 10. (20–24 November) Cardinality of sets. Assignment #10 due on Thursday, 23 November. Take-home final examination distributed on Thursday, 23 November.

Week 11. (27 November – 1 December) Schröder-Bernstein Theorem. Assignment #11 due on Thursday, 30 November.

Week 12. (4–6 December) Catch-up and clean-up. Wednesday, 6 December, is the last day of classes.

Fall examination period. (8–20 December) Take-home final examination due on Friday, 16 December.

Academic Integrity

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more: www.trentu.ca/academicintegrity.

For clarity, the following guidelines will apply in MATH 2200H:

You are permitted and encouraged to work with others and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions for the assignments, and to consult whatever sources you wish. However, **all work submitted for credit must be written up entirely by yourself, giving due credit to all the sources of help and information that you actually used.** There will be greater restrictions on the take-home final examination, which will be spelled out on the exam.

Access to Instruction

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and documentation from a regulated health care practitioner and feels that he/she may need accommodations to succeed in a course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible.

Web Page

This course will not use Blackboard/LearningSystem. It will, however, have a web page with hopefully up-to-date information and links to all the assignments and other handouts at:

euclid.trentu.ca/math/sb/2200H/

This page also has links to handouts, assignments, and exams from several past iterations of the course.