

INTRODUCTION TO PROOFS AND PROBLEM SOLVING

MATH 221 – FALL 2025

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Course webpage: <https://urcourses.uregina.ca/course/section.php?id=525659>
Classes: Monday, Wednesday, Friday 9:00am-10:00am in CL 110
Office hours: Monday and Wednesday, 10 am-11 am in CL
or by appointment (on zoom or in person)

Course-related material, such as homework assignments or topics cover per course, will be posted on URCourses.

Textbook: *An Introduction to Mathematical Thinking, Algebra and Number Systems*, by Will Gilbert and Scott Vanstone. Additional open-source materials will be provided via UR Courses to support your studies.

Catalog Description: An introductory course intended to familiarize students with mathematical reasoning and proof techniques, including direct reasoning, indirect reasoning, and mathematical reduction. Topics include elementary number theory, logic, sets, functions, and relations.

Purpose of Class: This class is designed for students in mathematics and computer science who need a practical introduction to proofs and mathematical reasoning.

Prerequisites: Two university math courses beyond MATH 102.

Learning outcomes:

- Logic and proofs;
- Integers and Diophantine Equations (the Division Algorithm, the Euclidean Algorithm, linear Diophantine equations, integers in different bases, prime numbers, and the Fundamental Theorem of Arithmetic)
- Exact ODEs and integrating factors;
- Congruences (congruence, divisibility tests, equivalence relations, modular arithmetic, linear congruence, the Chinese Remainder Theorem, Euler-Fermat Theorem);
- Induction and the Binomial Theorem;
- Functions and Bijections;
- Rational Numbers and Decimal Expansions (optional).

Exams: There will be five quizzes, one midterm exam, and one final *comprehensive* exam. The midterm will take place Friday, October 24. The final exam will be held during the exam period on December 10. A detailed description of the material covered by each exam will be provided on URCourse in due time.

Grading Policy: The final grade will be based on your best four quizzes, one midterm exam and the *comprehensive* final exam. It will be computed according to the following distribution:

- **Midterm:** 25% of your grade;
- **Quizzes:** 25% of your grade;
- **Final exam:** 50% of your grade.

Evaluations: The quizzes and midterm will take place in class. If you miss the midterm, then the weight of that midterm will be transferred to the final exam. There will be five quizzes. Your best four of five quizzes will be used to compute your overall quizzes grade.

A final grade of less than 50% is a failing grade for undergraduate courses.

Important Dates: Below is a summary of the important dates for the Fall 2025 term. You will find more informations at the website

<https://www.uregina.ca/registrar/index.html>

September 3	First day of class
September 19	Quiz 1
October 10	Quiz 2
October 13	Thanksgiving (No classes)
October 24	Midterm
November 7	Quiz 3
November 10-14	Reading week (no classes)
November 21	Quiz 4
December 4th	Quiz 5
December 4th	Last day of class
December 10	Final Exam in CL 110 at 9 am

Attendance Policy:

Attendance is STRONGLY recommended, but attendance will not be taken.

Materials Copyright:

All materials generated for this class are protected by Copyright laws. Distributing copies or sale of any of these materials is strictly prohibited.

Academic Fraud: Academic fraud is an act by a student that may result in a false evaluation. It is not tolerated by the University. Examples of academic fraud are: plagiarism, cheating of any kind or submit a work for which you are not the author, in whole or part. Any person found guilty of academic fraud will be subject to severe sanctions. Please consult the webpage <https://academic-integrity.uregina.ca> which contains regulations and tool to help you avoid plagiarism.

Student Success Centre: The Student Success Centre is a one-stop shop for academic support located in RC 230. Whether you are an experienced student or just starting out, you'll find some great resources to help you succeed.

With the Student Success Centre you can:

- connect with an advisor to develop individualized approaches and strategies to effectively handle the demands of your semester and get better grades;
- take advantage of free math tutoring;
- take part in study methods workshops (note taking, time management, exam preparation, stress management, etc.).

For more information: <https://www.uregina.ca/student-success-centre/index.html>.

Health and Wellness centre: Your wellness is an integral part of your success. If you don't feel well, it can be hard to focus on your studies. Dedicated professionals who care about you are always ready to provide advice and support. Depending on your needs, many activities and services exist to accompany you during your academic journey.

If you want to connect with a counsellor, you can book an appointment online, by email at student.wellness@uregina.ca, or over the phone at 306-337-2200. You can also drop-in to our

wellness space, chat online with a peer helper, or access 24/7 professional help through the website.

For more informations: <https://www.uregina.ca/wellness-centre/index.html>.

Academic Accommodations: We try to make sure all students with disabilities have equal access to learning and research environments, the physical campus and University-related programs and activities. UR Accomodated works with other campus services to create an accessible campus learning environment, where students with disabilities have an equal opportunity to flourish. We offer a wide range of services and resources, provided with expertise, professionalism and confidentiality.

Services include:

- help for students with disabilities in making the transition;
- permanent and temporary accommodation measures;
- adaptive exams.

You must register with Student Accessibility: https://uregina-accommodate.symplicity.com/public_accommodation/.

Students are encouraged to register with Student Accessibility early in order to ensure that registration is complete prior to the beginning of classes.

If you need to book an appointment or speak with an Accessibility Officer, please email accessibility@uregina.ca. Please include your full name, Student ID, and phone number in all email communication.