University of Regina

SYLLABUS

INTRODUCTION TO ABSTRACT ALGEBRA

MATH 223 – WINTER 2025

Territorial acknowledgement: The University of Regina is situated on the territories of the nêhiyawak, Anihšināpēk, Dakota, Lakota, and Nakoda, and the homeland of the Métis/Michif Nation. The Regina campus is on Treaty 4 lands, and Saskatoon classes are on Treaty 6 lands.

Instructor:	Dr. Alice Lacaze-Masmonteil
Personal webpage:	`https://alicelacaze-masmonteil.github.io`
Course webpage:	`https://urcourses.uregina.ca/course/view.php?id=33460`
Classes:	Tuesday and Thursday 4:30pm-5:45pm in CL 420
Email:	alk004@uottawa.ca
Office hours:	Tuesday and Thursday 3:00pm to 4:00pm in CW 307.14.30 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. Important information will also be sent by emails.

Textbook: *J. Gilbert and L. Gilbert, Elements of Modern Algebra (8^{th} edition).*

Catalog Description: An introductory course in modern algebra. Topics include number systems, groups, rings, integral domains, and fields.

Purpose of Class: This class is required for students in B.Sc. (Math/CS&M) programs (both regular and Honours) and for students in Secondary Mathematics Education Programs (EMTH/EMTI). It is an APEGS Approved Elective.

Prerequisites: MATH 221.

Exams: There will be one midterm on February 25th.

Calculators: Use of calculators is NOT allowed on the midterm and the final.

Grading Policy: The final grade will be based on class participation, *your best five of six* assignments, one midterm exam, and a *comprehensive* final exam. It will be computed according to the following distribution:

- **Class participation**: 5% of your grade;
- **Assignments (best 5 out of 6)**: 20% of your grade;
- **Midterm**: 25% of your grade;
- **Final exam**: 50% of your grade.

Class participation: Class participation will be evaluated on the submission of 20 in-class activities. One full-mark will be given for a completed activity.

Assignments policy: Assignments will be posted on URCourse. Assignments must be handed in at the beginning of class. Late assignments will not be accepted. Please contact me *before* the deadline if you need an extension. You are encouraged to work with your peers as long as you indicate with whom you worked with.

Exam policy: All exams will be held in person in CL 420. Calculators and computers will not be allowed. Failure to attend the midterm for any reason will result in its weight being added

to the weight of the final.

Important Dates: Below is a summary of the important dates for the Winter 2025 term.

January 6	First day of the term
January 21	**Assignment 1 due**
January 30	**Assignment 2 due**
February 11	**Assignment 3 due**
February 17-23	Reading week (no classes)
February 25	**In-class midterm**
Mach 13	**Assignment 4 due**
March 17	Last day to drop course
Mach 27	**Assignment 5 due**
April 8	**Assignment 6 due**
April 11	Last day of the term
April 24th (2pm-5pm)	Final Exam in CL 420

Course Outline (tentative):

Chapter 1	Fundamentals	3 lectures
	• Sets • Mappings • Relations • Permutations • Matrices	
Chapter 2	The Integers	3 lectures
	• Mathematical Induction • Prime factorization • Divisibility • Congruence classes • Modular arithmetic	
Chapters 3 and 4	Groups	5 lectures
	• Definition of a group • Subgroups • Cyclic groups • Isomorphisms • Homomorphisms • Permutation group • Cayley's Theorem • Normal subgroups • Cosets • Quotient Groups	
Chapters 5 and 6	Rings and Fields	6 lectures
	• Definition of a ring • Definition of a field • Integral domain • Ideals • Isomorphism	
Chapter 7	Real and Complex Numbers	3 lectures
	• The field of real numbers • Introduction to complex numbers • De Moivre's Theorem • Roots of Unity	

Chapter 8	Polynomials	3 lectures
	• Polynomials over a ring • Division of polynomials • Factorization in $F[x]$	

Attendance Policy: Attendance is strongly recommended, but attendance will not be taken. During each lecture, you will be given the chance to complete an in-class activity. You will be allowed to use your course notes and work with your peers. These in-class assignments be used to assess your in-class participation grade.

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 will 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 center:
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.

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

Academic Accommodations:
The University of Regina is committed to ensure that all students with disabilities have equal access to learning and research environments, the physical campus and University-related programs and activities. UR Accommodated works with other campus services to create an accessible campus learning environment, where students with disabilities have an equal opportunity to flourish. A wide range of services and resources are offered and provided with expertise, professionalism and confidentiality.

Services include:

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

If you are a students who needs accommodation, then 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.