MATH*3130 Abstract Algebra

Fall 2022
Section(s): C01

Department of Mathematics & Statistics
Credit Weight: 0.50
Version 1.00 - August 30, 2022

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1 Course Details

1.1 Calendar Description

This course is an introduction to abstract algebra, covering both group theory and ring theory. Specific topics covered include an introduction to group theory, permutations, symmetric and dihedral groups, subgroups, normal subgroups and factor groups. Group theory continues through the fundamental homomorphism theorem. Ring theory material covered includes an introduction to ring theory, subrings, ideals, quotient rings, polynomial rings, and the fundamental ring homomorphism theorem.

Pre-Requisites: MATH*1160, MATH*2000

1.2 Course Description

The subject is very classical and goes back many decades when the axiomatic approach began. The subject has evolved to incorporate modern applications such as Coding theory, Cryptography and Quantum Computing, to name a few, but before getting there the rudimentary foundations to this axiomatic style of mathematics need to be learned. Those who have studied this subject know that an effective way to understand this subject is to solve abstract algebra problems which can be very deep and require patience and reflection. Thus, the pedagogical approach to this course is to use modern online technology for assessment, communication and feedback, while simultaneously going through the task of solving very classical and challenging abstract algebra problems. This will greatly enhance the learning experience of all students enrolled in this course as it will facilitate the use of modern technology for the goal of enhancing student abstract algebra problem solving skills.

1.3 Timetable

F 10-30 AM - 11:20 AM. AD-S, VIRTUAL LEC **(this time slot will mainly be used for online quizzes)**

1.4 Final Exam

TBD ONLINE

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Peter Kim
Email: math3130@uoguelph.ca
Office: MACN515
Office Hours: TBD

2.2 Teaching Assistants

Teaching Assistant (GTA): Thomas Kielstra
Email: ikielstr@uoguelph.ca
Office Hours: TBD

2.3 Zoom Meeting

The default Zoom setting for this course will be:

https://zoom.us/j/9532058495

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3 Learning Resources

The pandemic was instrumental in enhancing and extending teaching creativity using online learning tools and platforms. The University's major investment in the Brightspace (D2L) platform is one of them but the added enhancements of Respondus Lockdown Browser as well as online capabilities have greatly facilitated real-time interaction, feedback capabilities as well as ensuring integrity. Although completely online synchronous/asynchronous instruction is not appropriate for all courses, especially at the introductory level, there is a place for online delivery for certain upper level courses particularly when the course learning experience is centred on "problem solving" which is the case for Abstract Algebra.This method of delivery will be exercised for this course.

3.1 Required Resources

Abstract Algebra: Theory and Applications (Textbook)
http://abstract.ups.edu/download.html
We will be using the 2022 edition.

CourseLink (Website)
https://courselink.uoguelph.ca/shared/login/login.html
CourseLink (powered by D2L's Brightspace) is the course website and will act as your classroom. It is recommended that you log in to your course website regularly to check for announcements, access course materials, and review the weekly schedule, assignments and quizzes.

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4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1.
   - understand the theory of abstract groups
   - master permutations and their relationship to general groups, culminating in the fact that all groups are equivalent to subgroups of symmetric groups
   - understand rings and generalizations of standard arithmetic
   - understand the notions of homomorphism with respect to both groups and rings

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5 Teaching and Learning Activities

Each week we will cover a chapter of material from the textbook along with a set of suggested exercises. There will be Supplementary material added to the Discussion board. This will include notes; videos and/or possible links to various websites that will further aid in the understanding of the weekly relevant material.

5.1 Lecture

Week 1

Topics: Chapter 1: Preliminaries

- Read Chapter 1 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 2

Topics: Chapter 2: The Integers

- Read Chapter 2 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.

- Follow and contribute to the Discussion board.

Week 3

Topics: Chapter 3: Groups

- Read Chapter 3 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 4

Topics: Chapter 4: Cyclic Groups

- Read Chapter 4 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 5

Topics: Chapter 5: Permutation Groups

- Read Chapter 5 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 6

Topics: Chapter 6: Cosets and Lagrange's Theorem

- Read Chapter 6 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 7

Topics: Chapter 9: Isomorphisms

- Read Chapter 9 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 8

Topics: Chapter 10: Normal Subgroups and Factor Groups

- Read Chapter 10 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 9

Topics: Chapter 11: Homomorphisms

- Read Chapter 11 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 10

Topics: Chapter 16: Rings

- Read Chapter 16 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 11

Topics: Chapter 17: Polynomials

- Read Chapter 17 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

Week 12

Topics: Chapter 18: Integral Domains

- Read Chapter 18 along with doing the assigned exercises.
- Supplementary material will be available on the Discussion board.
- Follow and contribute to the Discussion board.

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6 Assessments

Assessments will be in the form of online quizzes using Respondus Lockdown Browser. Details are provided in the following.

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Quiz 1	10
Quiz 2	12
Quiz 3	12
Quiz 4	12

Name	Scheme A (%)
Quiz 5	12
Quiz 6	12
Final Exam	30
Total	100

6.2 Assessment Details

Quiz 1 (10%)
Date: Fri, Sep 9, 10:30 AM - Fri, Sep 16, 11:00 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. This quiz is to get the equipment formalized and will allow unlimited attempts. Subsequent quizzes will be more restrictive.

Quiz 2 (12%)
Date: Fri, Sep 23, 10:15 AM - 11:45 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. Content will be Chapters 1-2. Starting this quiz only one 50 minute attempt will be allowed.

Quiz 3 (12%)
Date: Fri, Oct 7, 10:15 AM - 11:45 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. Content will be Chapters 3-4. One 50 minute attempt will be allowed.

Quiz 4 (12%)
Date: Fri, Oct 21, 10:15 AM - 11:45 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. Content will be Chapters 5-6. One 50 minute attempt will be allowed.

Quiz 5 (12%)
Date: Fri, Nov 4, 10:15 AM - 11:45 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. Content will be Chapters 9-10. One 50 minute attempt will be allowed.

Quiz 6 (12%)
Date: Fri, Nov 18, 10:15 AM - 11:45 PM, Quizzes in CourseLink
Respondus Lockdown Browser + Webcam will be used. Content will be Chapters 11 and 16. One 50 minute attempt will be allowed.

Final Exam (30%)
Date: TBD

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7 University Statements

7.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly:

e-mail is the official route of communication between the University and its students.

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

7.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

7.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student

Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

7.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

7.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

7.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
