

COURSE OUTLINE

MATH 312: Abstract Algebra I

Instructor

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General Course Information

Number of Units 1.5

Pre-requisites

- One of MATH 110, MATH 133, MATH 211, MATH 233A; and
 - MATH 212 or MATH 233C; or
 - permission of the department.

Office Hours and Assistance

Wednesday 2:30 pm to 3:20 pm, DTB A444

Friday 9:30 pm to 10:20 pm, DTB A444

or by appointment

Other Help The Mathematics & Statistics Assistance Centre is a large space where students can go to work, on their own or in groups, and to discuss math & stats problems. The Centre is staffed with talented Teaching Assistants who are happy to discuss primarily first and second year course material with you. Please see <http://www.math.uvic.ca/~msassist/index.html> for more information.

Math Club Students in Undergraduate Mathematics and Statistics (SUMS) was founded in 2014 as the reincarnation of a previous undergraduate course union that had been inactive for a few years. Please see <http://www.uvic.ca/science/math-statistics/current-students/undergraduate/sums/index.php> for more information.

Learning Objectives

- working knowledge of concepts of modern algebra: groups, rings and fields.
- to read and understand precise mathematical statements and their proofs



- to construct and carefully present written proofs of mathematical statements
- to investigate mathematical structures, to formulate and prove correct statements of general properties and to find counter-examples to false ones.

Course Material and Online Resources

Lecture Notes A set of notes for this course which follow the lectures quite closely will be available through CourseSpaces. (They will be updated, from time to time.)

Text There is a free on-line text by Thomas Judson which will cover most of the material: <http://abstract.ups.edu/download/aata-20170805.pdf>

Background lecture notes The main prerequisite for the course is Math 212. A copy of my notes for Math 212 will be available through CourseSpaces.

Course webpage Other materials for the course will be available through CourseSpaces. These include:

- a schedule of lecture topics, assignments and midterms.
- assignments
- information for exams.

Calculator Calculators are not permitted in this course.

Class Meetings

Lectures are Mondays and Thursdays from 10:00 AM to 11:20 PM in CLE D134.

Specific Topics

1. Groups
 - (a) Basics
 - (b) External direct products
 - (c) Normal subgroups
 - (d) Internal direct products
 - (e) Quotient groups
 - (f) Group homomorphisms
 - (g) The kernel of a homomorphism
 - (h) The first isomorphism theorem
 - (i) Finite abelian groups
 - (j) Free groups



2. Rings

- (a) Basics
- (b) Ideals
- (c) Quotient rings
- (d) Ring homomorphisms
- (e) The kernel of a ring homomorphism
- (f) The first isomorphism theorem

3. Polynomial Rings

- (a) Basics
- (b) Tests for irreducibility
- (c) Ideals and quotient of polynomial rings

4. Fields

- (a) Roots in extension fields
- (b) Extension fields as vector spaces
- (c) Extending extensions and splitting fields.
- (d) Algebraic extensions

Evaluation and Grading

- Homework. There will be six assignments, due roughly every two weeks. They will be weighted equally and the lowest score will be dropped.
- Midterms. There will be one midterm exam on Monday, October 23, during class time.
- There will be a three-hour final exam during the final exam period scheduled by the records office.

Your final percentage grade will be computed according to the following scheme.

Homework Assignments	Midterm Oct. 23	Final Exam TBA
40 %	20 %	40 %

Accessibility Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the Centre for Accessible Learning (CAL) as soon as possible. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations <http://uvic.ca/cal>. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.



Grading Percentage scores will be converted to letter grades according to the university-wide standard table

(<http://web.uvic.ca/calendar2017-05/undergrad/info/regulations/grading.html#>).

Final Examination Off-schedule final examinations (i.e., deferred examinations) are given only in accordance with the university policy as outlined in the Calendar. If you are unable to write a final examination due to illness, accident or family affliction, please refer to the following webpages for detailed instructions how to proceed:

<http://web.uvic.ca/calendar/undergrad/info/regulations/concessions.html#>.

Students are **strongly advised not to make plans for travel or employment during the final examination period** as special arrangements will not be made for examinations that conflict with such plans.

Supplemental Examinations. The Department of Mathematics and Statistics does not award 'E' grades or offer Supplemental Examinations in any of its courses.

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete an anonymous survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey you will receive an email inviting you to do so. You will need to use your UVic netlink ID to access the survey, which can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

Policies and Ethics

Attendance The university Calendar states 'Students are expected to attend all classes in which they are enrolled.'

(see <http://web.uvic.ca/calendar/undergrad/info/regulations/attendance.html#>).

Our courses are conducted on that basis. If you miss an announcement (information concerning midterms, corrections to assignment, etc.) because you did not attend class, you must accept the consequences of not having learned of the change.

Guidelines on Religious Observances Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.

Missing work Late homework assignments will not be accepted. If a homework assignment is not completed due to accident, illness or family affliction as described un-



der <http://web.uvic.ca/calendar/undergrad/info/regulations/concessions.html#>, homework grades can be computed from the other completed homework assignments. If a midterm is missed due to accident, illness or affliction, it can be taken late.

Academic Integrity Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offenses.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the students transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity: <http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html#>

Homework should be 'your own work'. You may discuss problems with other students, ask me for help or search for answers elsewhere. But, wherever you have found a solution, you should understand it and write it out in your own words. Copying solutions from other students or other sources is not permitted. My expectation is that you should be able to explain your solution to me and answer any questions that I may have about it.

