



DALHOUSIE
UNIVERSITY

Faculty of Science Course Syllabus Department of Mathematics & Statistics

MATH 3032: Abstract Algebra II (Winter 2025)

Instructor: Theo Johnson-Freyd, theo.jf@dal.ca.

Lectures: Tuesdays and Thursdays, 11:35-12:55 Atlantic Time, Chase 227.

Office Hours: Wednesdays, 14:35-16:55 Atlantic Time, Chase 214.

Course website: <http://categorified.net/25Winter3032/>.

This course is governed by the academic [rules and regulations](#) set forth in the University Calendar and by the Senate.

Course description

A *ring* is an abstract setting in which to do basic arithmetic: addition, subtraction, multiplication. Examples of rings: the integers; the real numbers; the set of polynomial functions. This course will develop the theory of rings starting from basic definitions and going into the main constructions that produce new rings from old. Specific attention will be given to the theory of *factorization*. In some rings, but not in others, every element can be uniquely factored into prime elements. The class will end with the theory of *Gröbner bases*, which offer an algorithm for simplifying systems of polynomial equations analogous to the row-echelon reduction algorithm for systems of linear equations.

Course materials and delivery

The main textbook for the class is:

- **Abstract Algebra** by D. Dummit and R. Foote.

It is recommended but not required that students own a copy.

Homework assignments and other materials will be available on the [Course Content](#) page.

Lectures will be given in person. (The occasional lecture may be delivered over Zoom.) This is a small class. Although attendance is not mandatory, your presence or absence will certainly be noticed by all participants.

Course Assessment

Conversion of numerical grades to Final Letter Grades follows the [Dalhousie Common Grade Scale](#).

Weekly homework assignments: 50%.

I encourage you to work together to complete your homework assignments. [Studies have shown that social ties are a main predictor of success in STEM classes](#). Although you are encouraged to work together, the homework you submit must be written by you individually.

There are many online resources offering solutions to homework at all levels. If you choose to use such resources, please be cautious: they often provide too detailed an answer, and students can trick themselves into thinking that they understand more than they do by copying those answers.

Homework is due by the posted deadline. Homeworks should be well-organized and legible: either neatly hand-written or typed. Students will be allowed to drop one homework score for any reason. In the case of further extenuating circumstances, students should consult with the instructor.

Exams: 50%.

There will be one midterm exam and one final exam. Both exams will be delivered in-person. Students may bring prepared (paper!) notes with them, but may not use electronic resources during the exam. The midterm will be worth 20% of the final grade, and the final will be worth 30% of the final grade.

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate.

Digital communication

As per the University code, email is an authorized means of communication for academic and administrative purposes within Dalhousie. The University will assign all students an official email address. This address will remain in effect while the student remains a student and for one academic term following a student's last registration. This is the only email address that will be used for communication with students regarding all academic and administrative matters. Any redirection of email will be at the student's own risk. Each student is expected to check her or his official email address frequently in order to stay current with Dalhousie communications.

Missed or Late Academic Requirements due to Student Absence

As per Senate decision instructors may not require medical notes of students who must miss an academic requirement, including the final exam, for courses offered during fall or winter 2020-21 (until April 30, 2021). Information on regular policy, including the use of the Student Declaration of Absence can be found here: https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html.

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student,

you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia). Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness. Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca). Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

- General Advising: https://www.dal.ca/campus_life/academic-support/advising.html
- Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>
- Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
- Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

- International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

- Library: <https://libraries.dal.ca/>
- Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
- Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html
- Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>
- Fair Dealing Guidelines: <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

- Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html
- Student Advocacy: <https://www.dsu.ca/student-advocacy-service>
- Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

- Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>
- Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>
- Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>
- Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>