

# MATH 2040: Matrix Theory & Linear Algebra II

Dalhousie University - Winter 2025

**Instructor:** Daniel Teixeira, [daniel.teixeira@dal.ca](mailto:daniel.teixeira@dal.ca).

**Lectures:** Tuesdays and Thursdays 10:05-11:25 Atlantic Time. Dunn 117.

**Office Hours:** Tuesdays and Thursdays 12:00-13:00 or by appointment. Chase 352. [directions](#)

**Learning Centre:** M-F 11:30-16:30. Chase 119.

**Course website:** [www.mathstat.dal.ca/~teixeira/24Winter2040](http://www.mathstat.dal.ca/~teixeira/24Winter2040).

## 1 Syllabus

### 1.1 Course Description

MATH 2040 is designed to provide foundations of linear algebra required for mathematics, physics, computer science, and other fields of application. We will cover the basic theory of vector spaces, including the study of eigenvectors and inner product spaces.

*Prerequisites:* MATH 1030, and MATH 1000 or MATH 1215.

### 1.2 Course materials

The textbook for the class is Linear Algebra Done Right, fourth edition, by Sheldon Axler. This book is available from the Dalhousie Bookstore and from [the author's webpage](#). The author has also recorded [videos](#) summarizing sections of the book. Further resources recommendations will be available on the [Course Content](#) page at the course website.

### 1.3 Course Assessment

- Participation (5%): participation in class, office hours, discussion forums, and problem sets.
- Homework (15%): assigned weekly through WebWork.
- Midterm 1 (20%): in class on February 6.
- Midterm 2 (20%): in class on March 11.
- Final Exam(40%): scheduled by the Registrar's Office.

### 1.4 Course Policies

1. You can get help for this course at the Mathematics Learning Centre. It is located in Chase 119 and will be operating in-person and remotely. Tutors are available Monday through Friday from 11:30am - 4:30pm (in-person) and from 6:30- 7:30pm (remotely) on

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a first come, first served basis, free of charge. Register for the Brightspace "course" at [dal.ca/faculty/science/math-stats/about/learning-centre.html](https://dal.ca/faculty/science/math-stats/about/learning-centre.html) to access the online support and see the latest schedule. The Learning Centre also has large tables where you can work together.

2. You are allowed to a prepared handwritten A4 study sheet with you to your midterm tests and to the final exam.
3. The midterm tests will be **two-stage exams**. Students will first complete and turn in an individual exam and then, working in small groups, will complete the same exam again working in small groups.
4. In the event that you are unable to attend the midterm or final exam due to exceptional circumstances, please notify your instructor via email in advance to determine what alternatives may be possible.
5. Homework will be assigned weekly through WebWork on Brightspace. Your lowest homework score will be automatically dropped.
6. Late homework will not be accepted except with the instructor's prior permission. If you need a short given. When a request is made ahead of time, you do not need to submit a Student Declaration of Absence.
7. There is an opportunity to highlight applications of linear algebra to your field of interest in this class. By writing a short note on an applications of linear algebra, you can drop two low homework grades (for a total of 3 drops). You are welcome to use an AI chatbot to help you figure out an application, but your submission must use your own words.
8. Students are encouraged to work in groups - **studies have shown that social ties are a main predictor of success in STEM classes**. Still, each student must complete their own individual homework and exams.
9. Problem sets will be posted following roughly each chapter covered in the book. These will not be graded, but I strongly encourage you to work on them: while homework questions are designed as routine exercises to aid in your learning, problem sets challenge you with harder questions, and some of the problems might be in the exams. You can submit problems for feedback by your instructor in paper, via email, or during office hours.
10. 5% per cent of your grade is for participation. There are at least four ways to participate: asking or answering questions in class, coming to office hours, asking questions on the course Brightspace forum, and submitting problem sets for feedback. Each time you do so, you gain 1 participation point, and 5 points equals 5%. I reserve the right to not award points in case of frivolous activity, such as asking if  $1+1=2$  - the point is participation.

**Conversion of numerical grades to Final Letter Grades follows the **Dalhousie Common Grade Scale**:**

A+ (90-100)

A (85-89)

A- (80-84)  
B+ (77-79)  
B (73-76)  
B- (70-72)  
C+ (65-69)  
C (60-64)  
C- (55-59)  
D (50-54)  
F (<50)

## 2 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.

### 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](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](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 reason-

able 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](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](mailto:elders@dal.ca)). Information: [https://www.dal.ca/campus\\_life/communities/indigenous.html](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](https://www.dal.ca/academics/important_dates.html)

## University Grading Practices

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](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](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](https://www.dal.ca/campus_life/communities/indigenous.html)
- Black Students Advising Centre: [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)
- International Centre: [https://www.dal.ca/campus\\_life/international-centre/current-students.html](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](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](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](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](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>