

MATH 252
Linear Algebra II
Winter 2025

Instructor*: _____

Office/Tel No.: _____

Office Hours: _____

*Students should get the above information from their instructor during class time. The instructor is the person to contact should there be any questions about the course.

Recommended Text: *Linear Algebra Done Wrong*, by Sergei Treil. Available for free online at: https://www.math.brown.edu/streil/papers/LADW/LADW_2021_01-11.pdf.

Assignments: Given weekly. Every student can get one automatic two-day extension by emailing me before the deadline. Otherwise, no late assignment is accepted.

Midterm Break: No classes between February 24, 2025, and March 2, 2025.

Test: There will be one midterm in the sixth week. There will be no make-up test.

Final Exam: The final examination will be three hours long. It covers material from the entire course.

PLEASE NOTE: Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examination Office. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office, **not** to your instructor. It is the Department's policy and the Examination Office's policy **that students are to be available until the end of the final exam period. Conflicts due to travel plans will not be accommodated.**

Final Grade: The final grade will be based on the higher of (a) or (b) below:
a) 20% for the assignments, 30% for the midterm, and 50% for the final.
b) 20% for the assignments, and 80% for the final.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Calculators: Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted for the class test and final examination. For a list of Approved calculators see <http://www.concordia.ca/artsci/math-stats/services.html>

Prerequisite: MATH 251: in particular, the notions of Vector spaces over \mathbf{R} or \mathbf{C} , matrix of a linear transformation, change of coordinate matrix, etc. will be assumed as familiar to the student and not reviewed. For the student interested in reviewing those topics, they are covered in Chapter 1 and Section 2.8 of the suggested reference.

Week	Section	Topics
1	4.1	Complex numbers Eigenvalues and Eigenvectors
2	4.2	Diagonalization
3	5.1 5.2 5.3	Standard Inner product Orthogonality. Orthogonal/normal bases. Projections and Gram-Schmidt process
4	5.4 5.5	Least squares The adjoint of a Linear Operator
5	5.6 5.7	Isometries: unitary and orthogonal matrices Rigid motions in \mathbf{R}^n
6		Review Midterm Test
7	6.1 6.2 6.3	Schur triangular representation Normal and Self-Adjoint Operators Positive definite operators
8	6.3 6.4	Singular values decompositions Applications of SVD
9	7.1 7.2 7.4	Quadratic forms Diagonalization of Quadratic Forms Positive definite forms and Sylvester criterion
10	9.1	The Cayley-Hamilton Theorem The minimal polynomial
11	9.4 - 9.5	Jordan Canonical Form
12		REVIEW

Student Services

You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: <https://www.concordia.ca/students/services.html>

Academic Integrity and the Academic Code of Conduct

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: <https://www.concordia.ca/conduct/academic-integrity.html>" [*Undergraduate Calendar, Sec 17.10.2*]

Behaviour

All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the [Code of Rights and Responsibilities](#) which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property

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Extraordinary circumstances

In the event of extraordinary circumstances and pursuant to the [Academic Regulations](#) the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.