DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Math 2135, Linear Algebra
Winter 2020

Instructor: Prof. Peter Selinger, Chase 303
Email: selinger@dal.ca (please mention "2135" on the subject line)

Lectures: MWF 9:35-10:25, LSC C208

Office hours: TBA

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Course Description

This course is a continuation of Math 1030 with an emphasis on foundations and the theory of vector spaces and linear transformations. Additional topics include inner product spaces, symmetric and orthogonal transformations, bilinear forms, similarity and diagonalization, the solution of linear differential equations, and various applications in mathematics, physics and computer science.

Course Objectives/Learning Outcomes

The difference between Math 2040 and this course is that Math 2135 is a proof-based course. Not only will proofs be given in class, but students will learn to write proofs themselves. For many students, it is the first introduction to mathematical proofs. The course is suitable for honours students and others with an interest in rigorous mathematics.

Topics include: Complex numbers, fields, vector spaces, subspaces. Span and linear independence, bases, dimension. Linear maps, null space and range, dimension theorem, matrices, isomorphism of vector spaces, products and quotients. Polynomials. Eigenvalues, eigenvectors, and invariant subspaces, diagonalizability. Inner product spaces, orthogonality, orthonormal bases, Gram-Schmidt orthogonalization procedure. Unitary, self-adjoint, and normal operators, the spectral theorem, positive operators and isometries. Trace and determinants. Solution of linear differential equations.

Course Prerequisites

Math 1030 and Math 1000. Exclusions: Math 2040.

Course Materials

- Textbook: "Linear Algebra Done Right", 3rd edition, by Sheldon Axler. There is also a set of videos to accompany the book: http://linear.axler.net/LADRvideos.html
- Course website on Brightspace is accessed through dal.brightspace.com
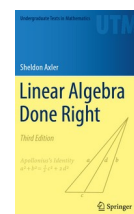
Course Assessment

Homework	25%	Assigned throughout the semester, to be handed in in class.
Midterm	25%	Wednesday, Feb 26, in class.
Final Exam	50%	3 hours – Scheduled by the Registrar. Must pass final exam to pass the course.

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

A+ [90-100]	**B+** [77-80)	**C+** [65-70)	**D** [50-55)
A [85-90)	**B** [73-77)	**C** [60-65)	**F** [0-50)
A- [80-85)	**B-** [70-73)	**C-** [55-60)	

University Policies and Statements

See Brightspace for Part B of this syllabus, "University Policies and Statements".

Course Policies

1. A great study space is the Mathematics Learning Centre which is located in Room 119 on the 1st floor of the Chase Building. Although Math 2135 is not officially served by the Learning Centre, you can drop by if you have difficulties with fundamental concepts. Tutors are available Monday–Friday 12–5pm on a first come, first served basis, free of charge. The Learning Centre also has large tables where you can work together. During the study break, Feb 17–21, the hours are 1–4pm. The Learning Centre is closed on Munro Day, Feb 7.
2. Calculators, textbooks, and notes are not permitted for Midterm Tests or the Final Examination.
3. Late homework will not be accepted except with the instructor's prior permission.
4. A missed midterm cannot be written at another time. If you miss the midterm without prior permission, then it will count as a 0. Exceptions are made in two cases: (1) if you obtain the instructor's prior permission to miss a midterm, or (2) if you have an officially valid excuse such as a medical doctor's note. In these cases, the weight of the missed midterm will be shifted to the final exam (e.g., the final exam will then count 75% instead of 50%). There is no make-up option for the final exam except in cases of an officially valid excuse such as a medical doctor's note.
5. Student Declaration of Absence forms will be accepted for missed homework, but not midterms or final exams. To miss a midterm or final exam, you must have a doctor's note signed by a medical professional.
6. Students are encouraged to study in groups, but each student must complete their own individual homework and exams. Homework must be written in your own words.