

# MATH 1104D Linear Algebra for Engineering or Science, Fall 2020 (Tentative course outline)

## A. BASIC COURSE INFORMATION:

**Instructor:** Nicholas Meadows

**E-mail:** nicholasmeadows (at) cunet (dot) carleton (dot) ca

**Textbook:** Linear Algebra and its Applications (with MyLab Access Code), Sixth Edition, David C. Lay, Steven R. Lay, and Judi J. McDonald. E-Textbook with MyLab Access Code is available from the university bookstore.

**Prerequisite:** Ontario Grade 12 Mathematics: Advanced Functions, or MATH 0005, or equivalent, or permission of the School.

**Calendar description:** Systems of linear equations, matrix algebra, determinants, invertible matrix theorem, Cramer's rule. Vector space  $\mathbb{R}^n$ , subspaces, bases. Eigenvalues, diagonalization. Linear transformations, kernel, range. Complex numbers (including De Moivre's theorem). Inner product spaces and orthogonality. Applications.

**Lectures:** Weekly lectures will be posted online Mondays 12:00 PM EST. There will be weekly Q&A sessions on Thursdays 1:00-2:00 PM EST online via Zoom.

**Tutorials (online via Zoom):** During the regular tutorial times, and other times throughout the week.

**Office hours (online via Zoom):** Friday 2pm-3pm (subject to change).

**Class conduct:** Students are expected to behave in a professional manner at all times. Disrupting a class is considered to be an Instructional Offence (see University Calendar). Please adhere to the same standards of behaviour online that you follow in a real classroom.

### **Evaluation:**

8 online homework assignments (best 5 out of 8) 10%

Two written assignments 25%

One online midterm exam 25%

One online final exam 40%

**Online Quizzes Assignments:** There will be eight weekly quizzes; the best five will each count 2% towards the final grade. Each quiz allows up to 3 attempts to complete and there is no time limit. The quizzes are essential, not only because they allow students to practice the concepts; they allow students to become proficient with the mylab system. This is important as 65% of the final grade will be based on the online examinations taken through mylab (which do have a specific time limit).

**Online midterm exam:** There will be an 80-minute online midterm exam. The exam will be released to students on February 22nd at 12:00 PM EST and will be available until March 1<sup>st</sup> at 12:00 PM EST. Students can start the exam anytime during this period at their convenience. However, only one attempt is allowed; once the attempt is started, students have 80 minutes to complete the exam.

**Online final exam:** There will be a 3-hour online final exam scheduled during the usual exam period. It is the responsibility of each student to be available at the time of the final examination.

## **B. FURTHER IMPORTANT COURSE INFORMATION:**

- Lectures for the week will be prerecorded, and posted on cuLearn along with the lecture slides at 12:00 pm EST each Monday. Each week, there will be a forum focusing on the current week's topics where students can ask questions. The questions asked on the forum will be addressed in the weekly Q/A Session on Thursdays.
- Students are expected to study the weekly lecture notes and the relevant sections of the textbook prior to the tutorials and/or the Q and A session. Attending these sessions are not a substitute for studying the lecture notes and the relevant sections of the textbook by yourself prior to each session.
- If you are physically in a different time zone, please email the instructor (using your Carleton email account) during the first week of classes with the details of your time zone to discuss suitable accommodation.
- Instructions on how to join the Zoom sessions will be posted on cuLearn
- More details for lectures, tutorials and office hours will be posted on cuLearn.
- Be sure that you know the academic integrity standards at Carleton which can be found at <https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy.pdf>
- Please use your Carleton e-mail account for all course related e-mails.
- You are responsible for keeping up with information announced during the lectures and tutorials, or sent to your Carleton e-mail account, or announced in cuLearn.

## C. ACADEMIC ACCOMMODATION POLICIES:

### Policies:

- Academic accommodation: You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:
- **Academic accommodations or accommodations for students with disability:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows: Academic accommodations for students with disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or <https://carleton.ca/pmc/> for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send the instructor your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test requiring accommodation. After requesting accommodation from PMC, we can have a talk to ensure accommodation arrangements are made. For the deadline to request accommodations for the formally-scheduled exams, visit the PMC website, <https://carleton.ca/pmc/>. □R
- **Religious obligations and/or accommodation for pregnancy:** write to the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the student guide at <https://carleton.ca/equity/accommodation/academic/students/>

## D. COURSE OUTLINE:

This section contains information on the topics covered in the lectures/tutorials each week, as well as the release date for various assignments.

Week	Sections	Important Dates	Topics
Jan 11-17 (Week 1)	1.1, 1.2		Systems of Linear equations, Row Reduction and Echelon Forms
Jan 18-24 (Week 2)	1.3, 1.4	Quiz 1* Weekly tutorials start	Vector Equations, Matrix equation $Ax = b$
Jan 25-31 (Week 3)	1.5, 1.7	Quiz 2*	Solution Sets of Linear Systems, Linear Independence

Feb 1-6 (Week 4)	1.6, 1.10, 1.8	Assignment 1 released (Feb 1)	Applications of Linear Systems, Introduction to Linear Transformations
February 7-14 (Week 5)	1.9, 2.1	Assignment 1 due (Feb 14, 12PM EST) Quiz 3*	The matrix of a linear transformation, matrix operations
Feb 15-21 (Week 6)			None – Winter Break
Feb 22-28 (Week 7)	2.2, 2.3	Midterm**	The inverse of a matrix, Characterizations of invertible matrices
March 1-March 7 (Week 8)	2.8	Quiz 4*	Subspaces of $\mathbb{R}^{\{n\}}$ ,
March 8-March 14	2.9	Quiz 5*	Rank + Nullity Theorem, dimension of subspaces
March 15-March 21	3.1, 3.2, 3.3	Quiz 6*	Determinants, Properties of Determinants, Cramer's Rule
March 22-March 29	5.1, 5.2, 5.3	Quiz 7*	Eigenvalues and Eigenvectors, Similarity and Diagonalization
March 30-April 5	5.3 (cont.) Appendix B	Assignment 2 released (March 30)	Similarity and Diagonalization (cont.), complex numbers
April 6 – April 11	5.5, 6.1		Complex eigenvalues, inner product, length and orthogonality
April 12-18	6.2, 6.3	Assignment 2 due (April 12, 12 p.m EST), Quiz 8	Orthogonal sets, orthogonal projection
Exam Period (April 16-27)			

\* Quizzes will be released at 12:00 PM on Mondays, and will be due at 12:00 pm the following Monday. Quizzes not completed within the week will receive a 0. There is no time limit for quizzes and up to three attempts are allowed.

\*\* The midterm will be made available at 12:00 p.m. Monday, February 22<sup>nd</sup>, and must be completed by 12:00 pm Monday, February 28<sup>th</sup>. Once the midterm is started, students have 80 minutes to complete it. There are no rewrites.