TENTATIVE: MATH 1104 Linear Algebra for Engineering or Science, Section G/H/I, Winter 2022

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Office Hours There will be no formal office hours, so email is best. Any questions related to course operation should be emailed to the Professor. Any questions regarding tutorial, tests, assignments, or homework should be emailed to the TAs. (TA email addresses will be posted on BrightSpace).

Zoom Lectures Zoom sessions will be held on a yet-to-be-determined schedule. We will review key topics and go over examples from the notes. These sessions will be recorded and posted on BrightSpace. During these sessions, the emphasis will be on completing examples, not explaining definitions (and the like), so please come prepared, but: **Any and all of your questions are always welcome!**

Notes **Previous year's** notes and additional content will be posted. The relevant portions must be reviewed prior to the associated Zoom session (you will be notified!).

Tutorials TENTATIVELY: There will be **one in-person** tutorial group, and **one online** session (not recorded). TAs will present tutorials from the Tutorial Manual every week. The *Tutorial Compendium* is a highly recommended resource - it is a record of all possible tutorial questions, with full solutions, you can possibly be asked!

Assignments Assignments will be due at regular intervals throughout the term. Please note posting and due dates as they are announced.

MyLab Access to MyLab is required for this course. Purchase options will be shared during the first week of the course. Many evaluations will use this online resource, and they will all be accessible through BrightSpace. In particular, regular online homework sets will be assigned for the purpose of practice, and to gain proficiency on the platform. Tests and final exam will also use this platform.

Tests Tests will be held online, hosted on MyLab. Please note dates as they are announced. There will be **no make up tests**.

Textbook *Linear Algebra and its Applications, 6th Edition* (**with MyLab access code**) by David C. Lay, Pearson Education (availability details TBA).

Tutorial Manual *The Tutorial Compendium for Linear Algebra for Engineering and Science, 2nd Edition* by Mark Blenkinsop, Prometheus Press (availability details TBA).

Grading

Homework Sets (4 in total, each worth 2.5%, hosted on MyLab):	10%
Assignments (3 in total, each worth 15%, hosted on BrightSpace):	45%
Tests (2 in total, each worth 5%, hosted on MyLab):	10%
Final Exam (hosted on MyLab):	35%

Evaluation

• Scientific calculators and online calculators are permitted in this course, and it is worthwhile learning all functions they have to offer, however, direct copying of solutions of any kinda is not permitted (see below - plagiarism).

• Tutorials are compulsory, but not graded. They form one of the best opportunities for learning, and are an integral part of overall understanding, and preparation for tests and the final exam. The listed Tutorial Compendium is a proven reference for students: It is a record of all tutorial questions **and** solutions you may face throughout the term, and serves as an excellent study guide. Tutorial manuals will be available in various formats (details TBA).

• Tests and Homework Sets will be online, hosted on MyLab on specified dates. They will be accessible for a period of time; test will be timed. Please note that these dates and times **may or may not** coincide with scheduled lectures or tutorials. If any of these are missed for valid reason, alternate arrangements will be made at the discretion of the Professor.

• Assignments are comprehensive: They are challenging, thorough, and encourage learning. You may seek outside assistance to solve problems, but direct copying of solutions of any kind is not permitted. Assignments must be submitted in pdf format - please familiarize yourself with scanning apps (e.g. CamScanner, etc.). Late submissions may be subject to penalty, at the discretion of the Professor. Please note all submission details as they are announced.

• A 3-hour final examination will be held during the exam period, covering the entire course. The exam will be online, hosted on MyLab. E-proctoring software will **NOT be used**. The option of re-weighting any amount of the term towards the Final Exam is **NOT** available.

Conduct and Content Policies

• COVID has put stresses on many of us, and left many things uncertain. In particular, I, the Professor, have little kids, and they are obviously my priority. Please keep all of these kinds of factors in mind as we navigate through this course.

• TAs are here to help! Anyone seeking assistance solving homework problems, tutorial topics, or assignment questions are encouraged to ask their TA.

• The Professor, the TAs, and all students have the Right to Disconnect. None of us can expect 24/7 responses from anyone else. Only under certain circumstances would urgent matters be communicated, and they will be clearly marked.

• Violations of Carleton's Integrity Policy will be dealt with in a formal fashion. All suspected incidents will be forwarded to The Office of The Dean of Science. Students are expected to be familiar the Academic Integrity Policy.

• **Plagiarism** is a specific matter of Academic Integrity. Plagiarism includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. In mathematics, an answer **can not** be plagiarized, but the **presentation of its solution can!** Thus, copying answers from fellow students, online posts, or online calculators (such as Wolfram, Symbolab, etc.) is strictly prohibited.

• All classroom teaching and learning activities (lectures and tutorials), and online content is COPYRIGHTED. Students are encouraged to use the notes and download any and all course materials for their own educational use. However, students are NOT PERMITTED to post or share files externally, or distribute content in any way without permission.

Accommodation Policies For All

• Students entitled to academic accommodations in this course must register with the Paul Menton Centre (PMC) for a formal evaluation, and have a Letter of Accommodation sent to the Professor by their Coordinator. Any such student must confirm their needs with the Professor before it can be applied to any evaluation element (test, assignment, exam, etc.).

• All other accommodations will be followed in accordance with University policy, and administered by the Office of Equity Services.

Generalized List of Topics for MATH 1104

Complex numbers:
Operations and properties, including rationalizing the denominator
Standard form, polar form, and DeMoivre's Theorem

Vectors:
Operations and properties
Norms and normalization
Angle between vectors
Projections

Matrices:
Operations and properties
Matrix multiplication
Classic matrix types and forms, including Elementary Matrices
Matrix computations
Rank of a matrix

Systems of Linear Equations:
The Matrix Equation
Row operations and Row Reduced Echelon Form (RREF)
Solutions types, including Vector Parametric Form
Homogeneous systems (with a preview of Eigenvales and Eigenvectors)

Matrix Inverses and Determinants:
Operations and properties
Methods for computing the inverse (determinant-adjoint method, and row operations method)
Methods for computing determinants (co-factor expansions, +/- patterns, row/column operations)
Application of inverses and determinants (Cramer’s Rule)

Eigenvalues, Eigenvectors, Diagonalization:
Definition and properties
Characteristic polynomial
Methods to solve for Eigenvalues and Eigenvectors (real and complex)
Diagonalization (including algebraic and geometric multiplicity)

Linear Transformations:
Definitions and properties
The standard matrix and compositions
Images, One-to-one, Onto, and invertability

Vector Set Theory:
Linear combinations
Linear dependence and independence
Vector spaces, subspaces, column spaces, row spaces
Orthogonality (including orthogonal projections, Gram-Schmidt process, Least Squares approximation)