Linear Algebra for Engineering or Science
Math1104D, Winter 2022

Instructor: Dr. Steven Wang, 4368HP
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Lectures: Tuesday, Thursday 1:05pm - 2:25pm, online

Tutorials: Thursday, 5:35pm - 6:25pm

Sections	*Room*	*TA's name*	*TA's email*
$H1$	TBA	TBA	TBA
$H2$	TBA	TBA	TBA
$H3$	TBA	TBA	TBA
$H4$	TBA	TBA	TBA
$H5$	TBA	TBA	TBA

Office hours: Tuesday 10:00am-11:00am.

Textbook: "*Linear Algebra and its applications.*", by David C. Lay, Steven R. Lay, Judi J. McDonald (Pearson Education, 6th edition).

E-Textbook with MyLab Access Code can be purchased directly from the publisher (Pearson) either as a bundle or separately. Links to purchase options from the publisher will be posted on the course Brighstpace page. E-Textbook with MyLab Access Code can also be purchased from the university bookstore. You might wish to compare pricing at both places before making your purchase.

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

Course Objective: The purpose of this course is to introduce students system of linear equations, matrix algebra and vector spaces, determinants, complex numbers, Eigenvalues, orthogonalization and applications.

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.

Evaluation: 2 Mylab tests worth 5% each (10% total); 4 Mylab homeworks worth 2.5% each (10% total); 3 written assignments (posted in Brightspace) worth 15% each (45% total); 1 final exam (in MyLab) worth 35%.

Tutorials: Tutorials begin on January 20, 2022. There will be online problem-solving sessions during the tutorial hours. There might also be in-person tutorial sessions, depending on the number of students registered for the in-person tutorial.

Final Examination: This is a three hour closed-book exam scheduled by the University and will take place sometime during the examination period (April 11-26, 2022). Students wishing to see their examination papers must make an appointment within three weeks of the examination. This privilege is for you to learn where you went wrong and is not an opportunity to argue about the marking!

Calculators: You may use only simple non-programmable, non-graphing calculators for the tests and the final examination in this course. I reserve the right to disallow any calculators.

Tutorial Centre: The Math Tutorial Centre will be available via a link in Brightspace called "(MTC) Online Math Tutorial Centre (Winter 2022)". More details can be found here: https://carleton.ca/math/math-tutorial-centre/

Academic Accommodation
You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

- **Pregnancy obligation:** write to me 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 accom-

modation regarding a formally-scheduled final exam, you must complete the Pregnancy Accommodation Form, found under https://carleton.ca/equity/contact/form-pregnancy-accommodation/.

- **Religious obligation:** write to me 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 here: https://carleton.ca/equity/focus/discrimination-harassment/religious-spiritual-observances/.

- **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 mailto:pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit https://carleton.ca/equity/focus/sexual-violence-prevention-survivor-support/.

- **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities

beyond the classroom experience. Reasonable accommodation will be provided to students who compete or perform at the national or international level. Write to me 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. See also https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf.

Special Information Regarding Pandemic Measures

While this course will be fully online, instructors are still supposed to include the following general information in each course outline.

All members of the Carleton community are required to follow COVID-19 prevention measures and all mandatory public health requirements (e.g. wearing a mask, physical distancing, hand hygiene, respiratory and cough etiquette) and mandatory self-screening (see https://carleton.ca/covid19/cuscreen/) prior to coming to campus daily.

If you feel ill or exhibit COVID-19 symptoms while on campus or in class, please leave campus immediately, self-isolate, and complete the mandatory symptom reporting tool (see https://carleton.ca/covid19/cuscreen/symptom-reporting/). For purposes of contact tracing, attendance will be recorded in all classes and labs. Participants can check in using posted QR codes through the cuScreen platform where provided. Students who do not have a smartphone will be required to complete a paper process as indicated on the COVID-19 website (see https://carleton.ca/covid19/).

All members of the Carleton community are required to follow guidelines regarding safe movement and seating on campus (e.g. directional arrows, designated entrances and exits, designated seats that maintain physical distancing). In order to avoid congestion, allow all previous occupants to fully vacate a classroom before entering. No food or drinks are permitted in any classrooms or labs.

For the most recent information about Carleton's COVID-19 response and required measures, please see the University COVID-19 webpage, https://carleton.ca/covid19/, and review the Frequently Asked Questions (FAQs), https://carleton.ca/covid19/faq/. Should you have additional questions after reviewing, please contact mailto:covidinfo@carleton.ca.

Please note that failure to comply with University policies and mandatory public health requirements, and endangering the safety of others are considered misconduct under the Student Rights and Responsibilities Policy, https:

//carleton.ca/studentaffairs/student-rights-and-responsibilities/. Failure to comply with Carleton's COVID-19 procedures may lead to supplementary action involving Campus Safety and/or Student Affairs.

Math1104D Tentative lecture schedule–subject to change

Week	Dates	Sections	Topics
1	Jan. 10-14	1.1-1.2	System of linear equations, Row Reduction, Echelon forms,
2	Jan. 17-21	1.3, 1.4, 1.5	Vector equations, Matrix equations, solution sets of linear systems **Mylab homework 1**
3	Jan. 24-28	1.7-1.8	linear independence, linear transformations **Mylab Test #1**,
4	Jan. 31-Feb. 4	1.9, 2.1-2.2;	matrix of linear transformation Matrix operations, invertible matrices **Assignment #1 due on Feb. 3**
5	Feb. 7-11	2.3-2.4	Invertible matrices, Partitioned matrices **Mylab homework 2**
6	Feb. 14-18	2.8-2.9	Subspaces of $\mathbb{R}^n$, Dimension and Rank
7	Feb. 21-25		Winter break
8	Feb. 28-Mar. 4	3.1-3.2,	Determinant, Property of determinant, **Assignment #2 due on Mar. 3**
9	Mar. 7-11	3.3, 5.1, 5.2	Cramer's Rule, Eigenvectors and Eigenvalues The characteristic equation, **Mylab homework 3**
10	Mar. 14-18	5.3. -5.4	Diagonalization, Eigenvectors and linear transformations, **Mylab Test # 2**
11	Mar. 21-25	Appendix B, 5.5	Complex numbers, Complex Eigenvalues **Mylab homework 4**
12	Mar. 28-Apr. 1	6.1-6.2	Inner product, orthogonality, orthogonal sets **Assignment #3 due on March. 31**
13	Apr. 4-8	6.3-6.4	Orthogonal projections, Gram-Schmidt process.
14	Apr. 11-12		Course review