MATH 1030

Matrix Theory and Linear Algebra I

Winter 2021

Instructor:	Dr. Asmita Sodhi (acsodhi@dal.ca)
Lectures:	Online, asynchronous (recorded)
Tutorials:	None, online workspaces available during tutorial times
Student Hours:	Tuesdays 2-4pm, Fridays 10am-12pm on Collaborate Ultra (via Brightspace), or by appointment (all times in Atlantic time)
Website:	Brightspace

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

Welcome to MATH 1030! My name is Asmita, and my pronouns are they/them (or she/her). I'll be your instructor for this course. You can either call me Dr. Sodhi, Professor, or just Asmita – whichever is most comfortable for you (be aware that not all your professors will be okay with you calling them by their first name!).

I am here to support you in your learning, and have tried to design the course to allow for some flexibility so that you can work at your own pace (with some deadlines built in). For each lesson in this course, you will have access to lecture videos, a handout, and a completed set of notes (the notes will have numbers indicating which part of the page corresponds to which part of the lecture video). The purpose of the handouts are to guide your notes, and to save you some time (if you choose to use them) from writing down any long passages of text. The videos are posted in small parts, as well as one long video – so you can choose the method of content consumption that works best for you.

We are going to go through this course together in unusual circumstances, and for some of us these circumstances may be more difficult than others. You likely would have preferred for this course to be taught in-person (me too – I miss seeing my students!), and it is understood that there may be some challenges you might face as we continue with online learning. Again, I am here to support you in your learning – if you tell me you're having trouble with something, I am not going to judge you or think less of you. We're all navigating this uncertainty in our own ways, and I promise to approach this course with compassion.

And now, for the business part of this syllabus...

Course Description/Objectives:

This course is a self-contained introduction to Matrix Theory and Linear Algebra. Topics include: subspaces, linear transformations, determinants, eigenvalues and eigenvectors, systems of linear equations.
Prerequisite: Nova Scotia Advanced Mathematics 11 and 12 (or equivalent).

Textbook:

Matrix Theory and Linear Algebra by Peter Selinger. This is an open textbook available for free download on Brightspace.

Course Objectives:

Students will learn the basic concepts of linear algebra, including vector operations, the qualitative and quantitative solution of linear systems, matrix operations and matrix algebra, rank and determinant, linear transformations, eigenvalues and eigenvectors, linear independence and dependence, subspaces and spanning sets, bases and dimension.

Evaluation and Grading:

- **Homework** - There will be seven homework sets, one for each course module, which are to be completed online through WeBWork (via Brightspace). The problems will be based on class content and textbook problems. The lowest homework set mark will be dropped.
- **Application Assignments** - There will be six written assignments that ask you to apply the knowledge you have learned in the module to a different context than what is covered in the lecture or homework. These assignments are to be submitted through Brightspace. The lowest application assignment mark will be dropped.
- **Tests** - There will be three tests throughout the course, administered through Brightspace. The date of the final test will be set by the registrar during the official Dalhousie exam period from April 10-23, 2021, and will be available when the exam schedule is posted in February. These tests will *not* be cumulative (in the sense that you will not be explicitly tested on material from previous modules), but this course scaffolds and therefore there is often knowledge that is needed to understand concepts in one module that were first addressed in a previous module. Tests will be available for a 24h window. *You must pass at least 1 test to pass the course.*
- **Final Project** - The final project for this course will involve either writing a short report or creating a short video about an application of linear algebra to the topic of your own choosing. The purpose of this project is to help you see how the ideas we learn in the course can be helpful in your future areas of study or interest - your instructor didn't truly appreciate how important their first-year linear algebra course until they were in third year, and doesn't want you to have the same experience! There will be a short project outline assignment due before the final project - this is mostly as a checkpoint for you, so you can make sure that you are thinking about a possible topic ahead of time. Details about the final project will become available on February 8.

Course Assessment:

Homework	10%	*7 total, 1 dropped*
Application Assignments	25%	*6 total, 1 dropped*
Module Tests	45%	*3 total*
Final Project	20%	
Project Outline, 2%		
Project, 18%		

Module tests will be variable in how much they are worth – the test you do the best on will count a little extra (20% of your total grade), and your worst test will count a little less (10% of your total grade).

$$10\% + 15\% + 20\% = 45\%$$

Course Topics and Approximate Dates:

See MATH 1030 Schedule document on Brightspace

Important Dates:

January 15	Fees due for winter term; Last day to add winter term courses
January 17	Application Assignment 1 is due
January 29	Last day to drop winter term courses without a "W"
January 31	Application Assignment 2 is due
February 3	Test 1 (Modules 1 and 2)
February 5	Munro Day (university closed)
February 8	Final Project information is available
February 14	Application Assignment 3 is due
February 15-19	Reading Week
March 7	Application Assignment 4 is due
March 8	Last day to drop winter term classes with a 10% refund
March 10	Test 2 (Modules 3 and 4)
March 15	Project Outline is due
March 21	Application Assignment 5 is due
April 2	Good Friday (university closed)
April 5	Application Assignment 6 is due
April 8	Final Project is due
April 8	Last day to drop fall winter classes with a "W"
April 10-23	Final exam period; Test 3 (Modules 5, 6, and 7)

Letter Grade Distribution:

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

A+	(90-100)	B+	(77-79)	C+	(65-69)	D	(50-54)
A	(85-89)	B	(73-76)	C	(60-64)	F	(< 50)
A-	(80-84)	B-	(70-72)	C-	(55-59)		

Course Policies:

- We will be using Piazza for answering questions in this course – rather than emailing your content- or problem-related questions to the instructor or TAs, you are asked to post your questions on Piazza. The system is highly catered to getting you help fast and efficiently from classmates and the instructor. Before accessing Piazza, you will need to enroll in our course space at `https://piazza.com/dal.ca/winter2021/math1030`. You can find our class page at `https://piazza.com/dal.ca/winter2021/math1030/home` (both of these are also linked on Brightspace).

- For personal matters that warrant an email to be sent, please be aware that it could take some time for a response, depending on the issue. If your question is about something in the future (for example, you need an extension on something), you will get a response fairly quickly. If your question is about something in the past (for example, you're not sure about how you were graded on a problem you've already submitted), it may take a little longer for a response. Emails are answered as promptly as they can be, but please do not expect an immediate response every time.

- Extensions on assessments will not be granted after the due date for that assessment has passed. However, it is understood that things come up and life happens sometimes. If you need a short extension and contact the instructor ahead of time, one will always be given.

- Tests will be open-book, meaning that you may use your notes, textbook, and other static (not changing) resources. Communicating with others about the test is strictly prohibited, as is the use of resources (online or offline) that can perform linear algebra operations for you. You will be given adequate time for tests to complete the content as well as to account for any technical difficulties.

- In addition to TA student hours, this course is also supported by the online Math Learning Centre, which is available for assistance for the duration of the course. A link to this resource along with the Learning Centre hours will be found on Brightspace soon after classes begin, listed with course student hours.

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Missed or Late Academic Requirements due to Student Absence
As per Senate decision instructors may not require medical notes of students who must miss an academic requirement, including the final exam, for courses offered during fall or winter 2020-21 (until April 30, 2021). Information on regular policy, including the use of the Student Declaration of Absence can be found here: `https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html`.

Academic Integrity
At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.
Information: `https://www.dal.ca/dept/university_secretariat/academic-integrity.html`

Accessibility
The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).
Information: `https://www.dal.ca/campus_life/academic-support/accessibility.html`

Student Code of Conduct
Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.
Code: `https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html`

Diversity and Inclusion - Culture of Respect
Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness.
Statement: `http://www.dal.ca/cultureofrespect.html`

Recognition of Mi'kmaq Territory
Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).
Information: `https://www.dal.ca/campus_life/communities/indigenous.html`

Important Dates in the Academic Year (including add/drop dates)
https://www.dal.ca/academics/important_dates.html

University Grading Practices
https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

- General Advising: https://www.dal.ca/campus_life/academic-support/advising.html
- Science Program Advisors: https://www.dal.ca/faculty/science/current-students/academic-advising.html
- Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
- Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html
- International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic Supports

- Library: https://libraries.dal.ca/
- Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
- Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html
- Copyright Office: https://libraries.dal.ca/services/copyright-office.html
- Fair Dealing Guidelines: https://libraries.dal.ca/services/copyright-office/fair-dealing.html

Other Supports and Services

- Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html
- Student Advocacy: https://dsu.ca/dsas
- Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibiliti where-to-get-help/ombudsperson.html

Safety

- Biosafety: https://www.dal.ca/dept/safety/programs-services/biosafety.html
- Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html
- Radiation Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety.html
- Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html