

Faculty of Science Course Syllabus
Department of Mathematics and Statistics
MATH 1030 - Matrix Theory and Linear Algebra I
SUMMER 2024

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledge held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people. Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

ALL TIMES ARE IN ADT (Atlantic Daylight Time) = Halifax TIME

INSTRUCTOR: Hasan Mahmood
Course Code: MATH-1030
LECTURES: on MS Teams
Day & Time: M W F @ 11:05AM-12:55PM ADT
Dates: May 06 – June 21, 2024
OFFICE HOURS: MTWR 5:00PM-6:30PM ADT on MS Teams
Email: mh290120@dal.ca
Web: Dalhousie's Brightspace

Prerequisite. Nova Scotia Advanced Mathematics 11 or 12 (or equivalent)

Course Description. This course is a self-contained introduction to Matrix Theory and Linear Algebra. Topics include: systems of linear equations, vectors in \mathbb{R}^n , matrices, spans, linear independence, bases, dimension, linear transformations in \mathbb{R}^n , determinants, eigenvalues and eigenvectors, diagonalization, applications.

Textbook. "Textbook For This Course", Chapters 1,2,4,5,6,7, and 8.

Student Support. In addition to the my six office hours mentioned previously, you can also pose course-related questions on the Discussion Boards in Brightspace. Our team member, Leila Mohammadi, will be there to answer your questions. Furthermore, the MATH/STAT Learning Centre will offer their support both in person and remotely, Monday through Friday, from 12 PM to 4 PM Atlantic Time. Please register on the Brightspace page via the following link to access online support and view the most up-to-date schedule: <https://www.dal.ca/faculty/science/math-stats/about/learning-centre.html>.

WebWork Homework. You will have seven Homework assignments to be completed using WebWork, accessible on Brightspace. The lowest grade of these will be dropped.

Exams.

Midterm – May 30, 2024 (online - submission on Brightspace)

Final Exam – June 21, 2024 (in-person) during 11:00am-2:00pm at LSC Psychology P5260 & 4260.

Grading Scale.

Participation – 2% (bonus)

Homework – 25%

Midterms – 15%

Final Exam – 60%

Makeups - Homework. The lowest HW score will be dropped, so NO extensions/makeups will be given for HW.

Makeup - midterm. There will be no make-up examination for the midterm. If you be unable to submit the midterm examination, your midterm's weight will be transferred to your final exam score, and proper documentation may be required for this.

Makeup - Final Exam. If you will not be able to be physically on campus for the Final Exam on June 21, 2024, there is a make-up exam scheduled for August 26, 2024, 12:30pm-3:30pm at Rowe 1028 - Potter Auditorium. If possible, I highly encourage you to plan to make the main exam sitting in June, so as to have a back-up in case there is any need.

Attendance. Students are advised to attend all meetings.

Electronic Devices / Calculators. Calculators will not be needed, and not permitted for the final exam. Answers may be left unsimplified, though I would encourage you to practice simplifying an expression so that you can become comfortable if asked to do so.

Email Correspondence. All email correspondence relating to our course should be sent to mh290120@dal.ca (must include MATH-1030 in subject line to guarantee response, allow 24 working hours for response).

Course Policies related to Academic Integrity. Students are permitted to work together on the online assignments. No collaboration is permitted on the midterm nor the final exam.

Learning Objectives. Students will learn the basic concepts of linear algebra, including the qualitative and quantitative solution of linear systems, vector operations, matrix operations and matrix algebra, rank and determinant, linear transformations, eigenvalues and eigenvectors, linear independence and

dependence, subspaces and spanning sets, bases and dimension.

Additional Resources. If you are having trouble with material in the course, please join in my office Leila's office hours or email me to discuss your difficulties. You should do so before it is late; we are here to help!

MATH-1030 Schedule (tentative)

Textbook: "**Matrix Theory and Linear Algebra**" by Peter Selinger
Chapters 1,2,4,5,6,7, and 8.

Week of	Topics
May 06	Chapter 1: Systems of Linear Equations Sections: 1.1 - 1.5
May 13	Chapter 1: Systems of Linear; Chapter 2: Vectors in \mathbb{R}^n Sections: 1.6 - 1.8 Sections: 2.1 - 2.5
May 20	Chapter 2: Vectors in \mathbb{R}^n ; Chapter 4: Matrices Sections: 2.6 - 2.7 (Dot product, Projections, Cross product) Sections: 4.1 - 4.8 (Matrix arithmetic, Inverses)
Midterm week: May 30, 2024 (Online Midterm)	
May 27	Chapter 5: Spans, Linear dependence, and Bases in \mathbb{R}^n Sections: 5.1 - 5.2 (Span and linear independence) Sections: 5.3 - 5.5 (Subspaces and basis)
June 3	Chapter 6: Linear Transformations in \mathbb{R}^n ; Chapter 7: Determinants Sections: 6.1 - 6.4 (Linear Transformation, its matrix and properties) Sections: 7.1 - 7.5 (Determinant and its properties)
June 10	Chapter 8: Eigenvalues, eigenvectors, and diagonalization Sections: 8.1 - 8.4 (Eigenvalues, eigenvectors, and diagonalization) Sections: 8.5 - 8.9 (Applications)
June 21, 2024 – Final Exam (in-person)	
June 17	Review or "Catch-up" time
Important Note: The In-person Final Exam will be held on June 21, 2024 Section 5.5. during 11:00AM-2:00PM at LSC Psychology P5260 (120 seats) & 4260 (118 seats).	

UNIVERSITY POLICIES AND STATEMENTS

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 at 1321 Edward St or elders@dal.ca. Additional information regarding the Indigenous Student Centre can be found at: https://www.dal.ca/campus_life/communities/indigenous.html

Internationalization. At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

Academic Integrity. At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all 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. Additional academic integrity information can be found at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility. The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre (https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (<https://www.dal.ca/about-dal/agricultural-campus/student-success-centre.html>).

Conduct in the Classroom - Culture of Respect. Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

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 (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.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. The full Code of Student Conduct can be found at: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Fair Dealing Policy. The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy.html

Originality Checking Software. The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at: https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy.html

Student Use of Course Materials. Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.

STUDENT RESOURCES AND SUPPORT

University Policies and Programs.

- Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html
- Classroom Recording Protocol: https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html
- Dalhousie Grading Practices Policies: https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html
- Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html
- Sexualized Violence Policy: https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html
- Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

Learning and Support Resources.

- General Academic Support - Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html
- General Academic Support - Advising (Truro): <https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html>
- Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html
- On Track (help you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html
- Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
- Indigenous Connection: <https://www.dal.ca/about-dal/indigenous-connection.html>
- Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803): <https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf>
- Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

- International Centre:
https://www.dal.ca/campus_life/international-centre.html
- South House Sexual and Gender Resource Centre:
<https://southhousehalifax.ca/about/>
- LGBTQ2SIA+ Collaborative:
<https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html>
- Dalhousie Libraries:
<http://libraries.dal.ca/>
- Copyright Office:
<https://libraries.dal.ca/services/copyright-office.html>
- Dalhousie Student Advocacy Services:
<https://www.dsu.ca/dsas?rq=student%20advocacy>
- Dalhousie Ombudsperson:
https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html
- Human Rights and Equity Services:
<https://www.dal.ca/dept/hres.html>
- Writing Centre:
https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
- Study Skills/Tutoring:
http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html
- Faculty of Science Advising Support:
<https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

Safety.

- Biosafety:
<http://www.dal.ca/dept/safety/programs-services/biosafety.html>
- Chemical Safety:
<https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>
- Radiation Safety:
<http://www.dal.ca/dept/safety/programs-services/radiation-safety.html>
- Laser Safety:
<https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html>