

**Faculty of Science Course Syllabus**  
**Department of Mathematics and Statistics**  
**MATH 2030 (section 01)**  
**Matrix Theory/Linear Algebra I**  
**Summer 2017/2018**

**Instructor:** Melissa Huggan      Melissa.Huggan@Dal.ca      Chase 328  
**Lectures:** Tuesdays and Thursdays, 18:05-21:25      LSC Common Area C240  
**Office Hours:** Monday 17:30-19:00, Wednesday 13:00-14:30 (held in Chase 119), or by appointment.

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**Course Description**

*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. Students should note that this is a second-year course and, although it has no formal first year prerequisites, certain mathematical maturity is expected.*

**Course Prerequisites**

Nova Scotia Advanced Mathematics 11 or 12 (or equivalent)

**Course Objectives/Learning Outcomes**

*Upon completion of this course, I expect my students to*

- *Understand the geometric and algebraic interpretations of systems of equations.*
- *Be able to use row operations to solve a system of linear equations.*
- *Understand how to interpret the results from a row reduced matrix.*
- *Be able to determine the general solution of a system of linear equations, as well as the rank of a matrix.*
- *Understand the concepts of linear dependence and independence and be able to determine if a set of vectors are linearly independent.*
- *Be able to test whether a vector is an element of the span of a given set of vectors.*
- *Be able to determine if a subset of  $\mathbb{R}^n$  is a subspace.*
- *Understand the relationship between spanning sets, linear independence, and be able to determine a basis for a subspace from a spanning set.*
- *Be able to extend the basis of a subspace of  $\mathbb{R}^n$  to a basis of  $\mathbb{R}^n$ .*
- *Be able to determine a basis for the row space, column space, and null space (respectively) of a matrix, as well as their respective dimensions.*
- *Be able to work with matrix algebra.*
- *Understand the connections between properties of matrices.*
- *Be able to determine if a vector function  $T: \mathbb{R}^n \rightarrow \mathbb{R}^m$  is a linear transformation.*
- *Understand the properties of linear transformations, as well as the geometric interpretation.*
- *Be able to find the determinant of a matrix and understand the properties of determinants.*
- *Be able to find the inverse of a matrix using varying methods.*
- *Be able to compute the eigenvalues and eigenvectors of a matrix and use this information to determine if a matrix is diagonalizable.*

### Course Materials

- Textbook: “Matrix Theory and Linear Algebra”, Dalhousie 2017/18 edition. (open source, available on Brightspace)
- Brightspace: Assignments will be hosted through Brightspace (via Webwork), as well as important announcements (please keep notifications on) and other course information.
- Webwork: Your online assignments will appear in Webwork, accessed through links appearing under Content in Brightspace.

### Mathematics and Statistics Learning Centre

The Mathematics and Statistics Learning Centre, located in Chase 119, is there for you! It is a dedicated room for math and stats help for undergraduate students. For more information, including a schedule, see <https://www.dal.ca/faculty/science/math-stats/about/learning-centre.html>.

### Office hours

The instructor is also there to help you! Office hours are set up to give students a time slot to ask their instructor questions. Also, if you cannot attend the scheduled office hours, please email the instructor to set up an alternate time to meet.

### Other course requirements

- There are assigned readings for the course which are posted on Brightspace.
- There are **in-class activities** in this course. This could be in the form of a short quiz or group work.
  - o Quizzes are to be done individually, with no help from any resource.
  - o Group work: Students are encouraged to discuss a few questions in groups, then each student will individually write up solutions to hand in to the instructor. The goal of this assessment is to frequently check students’ understanding throughout the course as well for the student to receive regular feedback.
  - o I will drop your two lowest grades from the in-class activities.
- **Assignments** will be available online through Brightspace. All assignments are equally weighted. Assignments are set up to help students stay on track with the course material and assess their understanding.
- There are practice problems at the end of each section of the textbook. Students are expected to do these problems and are encouraged to speak with the instructor if they have difficulty completing any of the problems.

### Course Assessment

| Component                                        | Weight (% of final grade) | Date                                        |
|--------------------------------------------------|---------------------------|---------------------------------------------|
| <b>Midterm 1</b>                                 | <b>15%</b>                | <b>May 17</b>                               |
| <b>Midterm 2</b>                                 | <b>15%</b>                | <b>May 31</b>                               |
| <b>Final exam</b>                                | <b>50%</b>                | <b>June 14, 6:05 – 9:25pm</b>               |
| <b>In-class activities</b><br><b>exam dates]</b> | <b>10%</b>                | <b>daily [excluding the first class and</b> |
| <b>Assignments (webwork)</b>                     | <b>10%</b>                | <b>weekly</b>                               |

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

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

**Course Policies**

- *Late assignments will not be accepted.*
- *Examinations (midterms and final) will be held in class. The exams will be closed book, and calculators will **not** be allowed during in-class activities, the midterms or the final examination. In fact, only writing utensils (pencils, lead, erasers, pens, white-out) will be allowed.*
- *There will be no makeup midterms. If you miss a midterm without **prior** permission, then it will count as a zero. Exceptions are made in two cases: (1) if you obtain the instructor's prior permission to miss a midterm, or (2) if you miss a midterm for a medical reason and have a doctor's note (you must notify the instructor **prior** to the midterm, and provide a medical note upon your return). In these cases, the weight of the missed midterm will be shifted to the final exam (for example, if you miss one midterm, your final exam will be worth 65% of your final grade).*
- *Information about the course may be given during class. It is the responsibility of the students to ensure that they are made aware of what occurs during classes.*
- *No recordings of the class are permitted.*

**Course Content**

This is a tentative outline.

| <b>Dates</b> | <b>Topics</b>                                   |
|--------------|-------------------------------------------------|
| May 8        | Systems of equations, vectors in $\mathbb{R}^n$ |
| May 10       | Vectors in $\mathbb{R}^n$ , lines and planes    |
| May 15       | Matrix operations                               |
| May 17       | <b>Midterm 1</b><br>Transpose, inverse          |
| May 22       | Elementary matrices, linear transformations     |
| May 24       | Spans and linear independence                   |
| May 29       | Subspaces and bases                             |
| May 31       | <b>Midterm 2</b><br>Determinants and cofactors  |
| June 5       | Eigenvalues and Eigenvectors                    |
| June 7       | Diagonalization                                 |
| June 12      | Review                                          |
| June 14      | <b>Final Exam</b>                               |

For other important academic dates, see the Academic Calendar.

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## ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

[http://www.dal.ca/dept/university\\_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html](http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html)

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the ***Request for Accommodation*** form are available at [www.dal.ca/access](http://www.dal.ca/access).

## ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's ***Policy on Intellectual Honesty*** and ***Faculty Discipline Procedures*** is available here:

[http://www.dal.ca/dept/university\\_secretariat/academic-integrity/academic-policies.html](http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html)

## STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

"The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members."

The full text of the code can be found here:

[http://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

## COPYRIGHT

All members of the Dalhousie community are expected to comply with their obligations under Canadian copyright law. Dalhousie copyright policies and guidelines, including our Fair Dealing Guidelines, are available at <http://www.dal.ca/dept/copyrightoffice.html>. Copyright questions should be directed to the Copyright Office at [copyright.office@dal.ca](mailto:copyright.office@dal.ca).

## SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

| Service                           | Support Provided                                                                                                                                                                                                                                                                                                      | Location                                                                                                 | Contact                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General Academic Advising</b>  | Help with <ul style="list-style-type: none"> <li>- understanding degree requirements and academic regulations</li> <li>- choosing your major</li> <li>- achieving your educational or career goals</li> <li>- dealing with academic or other difficulties</li> </ul>                                                  | <b>Killam Library Ground floor</b><br>Rm G28<br><b>Bissett Centre for Academic Success</b>               | In person: Killam Library Rm G28<br>By appointment: <ul style="list-style-type: none"> <li>- e-mail: <a href="mailto:advising@dal.ca">advising@dal.ca</a></li> <li>- Phone: (902) 494-3077</li> <li>- Book online through MyDal</li> </ul>                                                                                                                                                                            |
| <b>Dalhousie Libraries</b>        | Help to find books and articles for assignments<br>Help with citing sources in the text of your paper and preparation of bibliography                                                                                                                                                                                 | <b>Killam Library Ground floor</b><br><br>Librarian offices                                              | In person: Service Point (Ground floor)<br><br>By appointment:<br>Identify your subject librarian (URL below) and contact by email or phone to arrange a time:<br><a href="http://dal.beta.libguides.com/sb.php?subject_id=34328">http://dal.beta.libguides.com/sb.php?subject_id=34328</a>                                                                                                                           |
| <b>Studying for Success (SFS)</b> | Help to develop essential study skills through small group workshops or one-on-one coaching sessions<br><br>Match to a tutor for help in course-specific content (for a reasonable fee)                                                                                                                               | <b>Killam Library 3<sup>rd</sup> floor</b><br><br>Coordinator<br>Rm 3104<br><br>Study Coaches<br>Rm 3103 | To make an appointment: <ul style="list-style-type: none"> <li>- Visit main office (Killam Library main floor, Rm G28)</li> <li>- Call (902) 494-3077</li> <li>- email Coordinator at: <a href="mailto:sfs@dal.ca">sfs@dal.ca</a> or</li> <li>- Simply drop in to see us during posted office hours</li> </ul> <b>All information can be found on our website: <a href="http://www.dal.ca/sfs">www.dal.ca/sfs</a></b> |
| <b>Writing Centre</b>             | Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) <ul style="list-style-type: none"> <li>- Learn to integrate source material into your own work appropriately</li> <li>- Learn about disciplinary writing from a peer or staff member in your field</li> </ul> | <b>Killam Library Ground floor</b><br>Learning Commons &<br>Rm G25                                       | To make an appointment: <ul style="list-style-type: none"> <li>- Visit the Centre (Rm G25) and book an appointment</li> <li>- Call (902) 494-1963</li> <li>- email <a href="mailto:writingcentre@dal.ca">writingcentre@dal.ca</a></li> <li>- Book online through MyDal</li> </ul> We are open six days a week<br><br><b>See our website: <a href="http://writingcentre.dal.ca">writingcentre.dal.ca</a></b>           |