Department of Mathematics & Statistics
Concordia University

> ## MATH 204
> Vectors and Matrices
> *Summer 2020*

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Preface: Due to exceptional circumstances, this course will be taught, and all assessments will be done completely ONLINE. Given the subject matter and nature of this course, at least one of the exams, including **the midterm and/or the final exam will be given online through the Concordia Online Exams (COLE) platform with online proctoring.** For more details read the ADDENDUM at the end of this Course Outline.

Textbook: *Elementary Linear Algebra*, Custom Version, 11th Edition, by H. Anton & C. Rorres (JohnWiley & Sons). The digital version of the textbook will be available at:
https://www.campusebookstore.com/AccessCodes/AccessCodeBrowse.aspx?CODEID=31873&bookseller_id=241.

Prerequisite: Math 201 or equivalent.

Office Hours: Your professor will announce his office hours during which he will be also available to give a reasonable amount of help. Note, however, that if you missed a class it is not reasonable to expect your professor to cover the missed material for you.

Tutorials: The material in this course requires a lot of practice. The Department has therefore organized special ONLINE tutorial sessions conducted every week to provide additional support to students outside the online lecture environment. These online sessions are conducted by tutors who will help with solving problems on the topics learned in class that week, with particular emphasis on the material that students may have difficulties with in this course.   Students are strongly encouraged to participate and be active at these problem-solving sessions. Tutorials are an important resource to help students succeed in this course.

Math Help Centre: In addition to Tutorials, a Math Help Centre staffed by graduate students is available. The schedule of its operation will be posted in the Department and on the Department webpage https://www.concordia.ca/artsci/math-stats/services/math-help-centre.html.

WeBWorK: Every student will be given access to an online system called **WeBWorK**. The system provides you with many exercises and practice problems. Students will use this system to do online assignments (see **Assignments** below). In addition, before the midterm test and before the final exam, a number of practice problems will be posted in **WeBWorK** to help you review the material of the course.

Assignments: Students are expected to submit assignments online using **WeBWorK**. Late assignments **will not** be accepted. Assignments contribute 10% to your final grade. Working regularly on the assignments is essential for success in this course. Students are also strongly encouraged to do as many problems as their time permits from the list of recommended problems included in this outline, as well as practice problems. A solutions manual for all odd-numbered questions is packaged with the textbook.

Calculators: Only calculators approved by the Department such as **Sharp EL 531** or the **Casio FX 300MS**, are permitted for the class test and final examination.
See http://www.concordia.ca/artsci/math-stats/services.html #calculators for details.

Midterm Test: There will be one **midterm test,** based on the material of lectures 1-6, which will contribute up to 25% to your final grade (see the **Grading Scheme** below).

It is the Department's policy that tests missed for any reason, including illness, cannot be made up. If you miss the midterm for any valid reason, e.g. illness, religious, etc., supported by appropriate documentation, the final exam will count for 90% of your final grade, and the assignments will count for the remaining 10%.

Final Exam: **The final examination will be given online through the COLE platform. The exam will cover all the course material, and will contribute up to 65% to the final grade (see the Grading Scheme)**

Grading Scheme: The final grade will be based on the higher of (a) or (b) below:

a) 10% for the assignments,
    25% for the midterm test,
    65% for the final exam.

b) 10% for the assignments,
    10% for the midterm test,
    80% for the final exam.

IMPORTANT: **PLEASE NOTE THAT THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE**

Lectures	Section	Topics	Recommended problems
1	1.1 1.2	Systems of Linear Equations Gaussian Elimination	1.1: 21 1.2: 3,6,8,16
2	 1.3	Gaussian Elimination Matrices and Matrix Operations	1.2: 26,28 1.3: 3fj,6de,7d
3	1.4 1.5	Inverses;Algebraic Properties of Matrices Elementary Matrices; Method to find A^{-1}	1.4: 1b,2c,17,22,29 1.5: 4cd,15
4	1.6 1.7	Linear Systems and Invertible Matrices Diagonal, Triangular and Symmetric Matrices	1.6: 5,12,16,19 1.7: 44, 45
5	2.1 2.2 2.3	Determinants by Cofactor Expansion Evaluating Determinants by Row Reduction Properties of Determinants, Cramer's Rule	2.1: 3c,25 2.2: 11 2.3: 22,27
6	3.1 3.2	Vectors in 2-space, 3-space, Norm, Dot Product, Distance in R^2, R^3	3.1: 10d, 20, 21, 27 3.2: 9,11a
7	 3.3	**Midterm Review** class (if time permits!) Orthogonality	3.3: 4, 8, 13, 21, 25, 27
8	3.4 3.5	Geometry of Linear Systems Cross Product	3.4: 4,10,13,16 3.5: 7,16,18
9	4.1 4.2	Real Vector Spaces: (Subspaces of R^n ONLY) Subspaces	4.1: 17,18 4.2: 1,6,8a,11a
10	4.3 4.4	Linear independence Coordinates and Basis	4.3: 2 4.4: 1, 12, 13
11	4.5 4.9	Dimension Matrix Transformations from R^n to R^m	4.5: 2,6,7 4.9: 1, 5, 9
12	 5.1 5.2	Examples of Matrix Transformations on the Plane. Eigenvalues and Eigenvectors Diagonalization	4.9: 31, 35 5.1: 5ab,10 5.2: 6, 7, 8, 20c
13		**REVIEW**	

Addendum: Due to exceptional circumstances, this course will be taught and all assessments will be done completely online. Given the subject matter and nature of this course, a midterm and/or a final online exam will be provided through the Concordia Online Exams (COLE) platform with online proctoring. More information about this may be found at the COLE website.

Please note the following respect to online proctored exams:

- That the exam will take place during the exam period at the designated date and time set by the professor (midterm) or the Exams Office (final). All exam times will be set to Eastern Standard Time.
- That your image, voice and screen activity may be recorded throughout the duration of the exam.
- That you must show your Concordia University Identification card to validate your identity. Alternative government issued photo identification will be accepted, though it is not recommended. Only identification in English or French will be accepted.
- That the recording will be encrypted and will only be viewed by authorized university personnel (no external entity has authorization to review the recording).
- That you will be responsible for ensuring appropriate properly functioning technology (webcam, a microphone, Chrome browser and an ability to download the Proctorio extension, as well as a reliable internet connection with a minimum of a 3G connection).
- That you should enter the virtual test site and become familiar with the software that will be used for their exam before starting the exam.
- That you will need a quiet place within which to take the exam. Earplugs or noise- cancelling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.

Students who are unable to write an exam because they are unable to meet the above conditions and requirements are advised that they will need to drop the course. More information can be provided on the next offering of this course by consulting the Department. Students are advised that the drop deadline (DNE) for this course is **July 2**.

Students who require additional accommodations for their exams due to a documented disability should contact the Access Centre for Students with Disabilities as soon as possible. If you face issues during the exam, you should inform your professor of those issues immediately. Please note that there are in-exam supports you should spend time getting to know. Visit the COLE website for more information.