MAT 1341C: Introduction to Linear Algebra, Winter 2017

Course description: Review of complex numbers. The fundamental theorem of algebra. Review of vector and scalar products, projections. Introduction to vector spaces, linear independence, bases; function spaces. Solution of systems of linear equations, matrix algebra, determinants, eigenvalues and eigenvectors. Gram Schmidt, orthogonal projections. Linear transformations, kernel and image, their standard matrices. Applications (e.g. geometry, networks, differential equations)

How to learn Linear Algebra

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Lectures: Tuesdays 13:00-14:30 and Thursdays 11:30-13:00 in FSS 2005. Prepare for class by reviewing the material of the previous class and reading the text. The section numbers corresponding to each lecture are given on the website.

DGDs: These are discussion groups on Mondays, led by a graduate student TA. **Attendance is mandatory. There will be tests scheduled during four of the DGDs this term. The first DGD is Monday, January 16th.** You will have registered for one of several equivalent DGDs, either at 14:30 or at 16:00 on Mondays. Attend the DGD to which you are registered.
In DGDs, you work through assignments and old tests as a group. Prepare for the DGD by attempting all exercises from the previous week. You should then ask the TA to go over the problems you found difficult.

Office hours: Mondays 11:00–12:00 and Thursdays 14:00–15:00, in my office. I am also always available for questions before and after lecture, at the classroom.

Website: http://mysite.science.uottawa.ca/mnevins/MAT1341/.
The website is very important to the course – students are expected to be aware of all material and announcements posted there.) Your grades will appear in the Blackboard GradeBook for this course, and the course notes are available on Blackboard Learn.

Textbook: *Vector Spaces First* by Thierry Giordano, Barry Jessup and Monica Nevins. Available as a pdf on Blackboard. The order in which we will cover the chapters is as follows:

Review and linear systems:	Chapters 2 and 3, then Chapters 11 through 14.
Vector spaces:	Chapters 4 through 10.
Matrices, Gram-Schmidt:	Chapters 15 through 19.
Diagonalization:	Chapter 1, and Chapters 21 through 23.
Linear transformations:	Chapter 24 (time permitting).

Another excellent resource is *Linear Algebra with Applications* by Keith Nicholson, which has been used in the past.

Homework: Associated to each lecture are exercises in the textbook, which you must do to actually learn Linear Algebra — reading the notes and understanding the theory is necessary but insufficient. For a more interactive experience, and practice with theory questions, there is an online Linear Algebra Question Bank, available from Blackboard, which consists of multiple-choice questions in the same spirit as some questions you'll have on the tests and final exam. These two types of homework will not be submitted or graded; but doing this work regularly throughout the term substantially increases your probability of success.

How you will be evaluated

Tests: There will be four 75-minute tests, written in your DGD:

Test 1:   Monday, January 23rd. Covers high school material reviewed in the first two lectures, as well as new material, up to the end of week 2.

Test 2:   Monday, February 13th. Covers material from weeks 3 through 5.

Test 3:   Monday, March 6. Covers material from weeks 5 through 7.

Test 4:   Monday, March 27. Covers material from weeks 8 through 10.

Final exam: There will be a 3-hour final exam, scheduled during the final exam period, April 11 to 28. It will cover all the material taught in the course.

Calculators: Calculators are not permitted on Tests or the Final Exam.

Final Grade: Let t_i, for $i = 1, 2, 3, 4$, denote your percentage grade on Test i, and let x denote your percentage grade on the Final Exam. Your final percentage grade will be determined by the formula

$$g = \begin{cases} x & \text{if } x \leq 45\% \\ \dfrac{1}{2}x + \dfrac{1}{16} \sum_{i=1}^{4} (t_i + x + |x - t_i|) & \text{if } x > 45\%. \end{cases}$$

This says: if you earn 45% or less on the final, then your final grade is your final exam grade. Otherwise, each of the four tests has equal weight, worth 12.5% of your final grade; but if you do better on the final exam than on a test, then the weight of that test is transferred to the final exam.

Test procedures: You may not enter after or leave before 20 minutes have passed from the beginning of a test. You must present your student card if asked. Any questions concerning marks or the marking must be submitted to the professor within two weeks after the test.

Additional resources

High school Vectors review: Vector geometry is essential to understanding Linear Algebra! Everything we do has as its foundation the notions of vector geometry, including lines, planes, vector addition and orthogonal projections. On Blackboard you will find the e-course notes relating to Vector Geometry from the course *MAT1339: Calculus and Vectors*. **You are assumed to know this material and the first test will include questions on it.**

Math Help Centre: You can get help at the *Mathematics Help Centre*

http://www.mathstat.uottawa.ca/ugrad/help_center_en.html.

This year, the Help Centre is located in TBT C115, due to construction on campus. It is open Monday–Wednesday 10:00–19:00, Thursday 10:00–17:00 and Friday 10:00–15:00, except during the study break and during the final exam period, when special hours apply. See the help centre website for details.

Study groups: Several residences and student groups offer study groups for MAT1341. It is beneficial and motivating to work with other students on understanding the material; some of your best learning occurs when you explain something to another person. (Caution: For course-related questions such as test procedures, content or scope, please ask the professor rather than relying on rumours!)

Applications: Linear Algebra is one of the most useful mathematical toolboxes (on par with Calculus) for the range of problems that it helps to solve. Feeling that it is all a bit too abstract? Check out Linear Algebra Close to Earth, a compilation of amazing applications of linear algebra to a broad variety of fields:

http://aix1.uottawa.ca/~jkhoury/linearmain.htm

Accessibility: The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs. The University of Ottawa is committed to ensure that persons with disabilities have equal access to its services and events. If you are in need of accomodation during this course due to a disability, please consult with Access Services as soon as possible:

http://sass.uottawa.ca/en/access

Academic regulations

Prerequisites: Completion of MAT1339 or Ontario 4U Calculus and Vectors (MCV4U), or an equivalent, with a passing grade is required for registration in this course. The courses MAT1341 and MAT1302 cannot be combined for credit.

Academic fraud: Please consult the University regulations on academic fraud § 14:

https://www.uottawa.ca/administration-and-governance/policies-and-regulations

Devices on tests: Cellular phones, unauthorized electronic devices or course notes are not allowed during tests and exams. Phones and devices must be turned off and put away in your bag. Do not keep them in your possession, such as in your pockets. **If caught with such a device or document, academic fraud allegations may be filed which may result in you obtaining a 0 (zero) for the exam.** Therefore: come to your exams with a plan of how to store your device away from your person.

Statement on prevention of Sexual Violence: The University of Ottawa does not tolerate any form of sexual violence. Sexual violence refers to any act of a sexual nature committed without consent, such as rape, sexual harassment, or online harassment. The University, as well as student and employee associations, offers a full range of resources and services allowing members of our community to receive information and confidential assistance and providing for a procedure to report an incident or make a complaint. For more information, visit:

http://www.uottawa.ca/sexual-violence-support-and-prevention

Sessional dates:

Term dates: January 9, 2017 to April 8, 2017

Reading week: February 19 to 25, 2017

Add date: January 24, 2017. Last day to make changes to your course selection.

Drop date: March 24, 2017. Last day to withdraw from a course and thus avoid receiving a final grade on your transcript.