
Syllabus: MAT1341E Introduction to Linear Algebra (Fall 2024)

INSTRUCTOR: Dr. Elizabeth Maltais

*****EMAIL**

emaltais@uottawa.ca

OFFICE:

STEM room 656 (150 Louis-Pasteur Pvt)

***please write “mat1341” in subject line of **all** emails to me!

DESCRIPTION OF THE COURSE 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)

Prerequisite: MAT1339 or Ontario 4U Calculus and Vectors (MCV4U), or an equivalent. The courses MAT1341, MAT1302 cannot be combined for units.

HOW TO SUCCEED IN MAT1341 AND HELPFUL RESOURCES

KEEP UP WITH THE LECTURES! Attend the lectures and take good notes.

LEC	Tuesday	1:00 PM – 2:20 PM	MNT 203
LEC	Thursday	11:30 AM – 12:50 PM	MNT 202

ATTEND THE MANDATORY DGDs! This is your Discussion Group, led by a graduate student TA. Prepare by doing the posted exercises, and use your time well by asking questions! You are registered to **one** of the following DGD sections:

DGD E01	Friday	11:30 AM – 12:50 PM	MRT 219
DGD E01	Friday	11:30 AM – 12:50 PM	STE F0126
DGD E03	Monday	4:00 PM – 5:20 PM	FTX 137
DGD E04	Monday	4:00 PM – 5:20 PM	SMD 227

STAY UP-TO-DATE WITH BRIGHTSPACE! The course webpage is on [Brightspace \(Virtual Campus\)](#) of the University of Ottawa. Announcements, lecture notes, quizzes, grades, and more will be posted there. You will need to check Brightspace regularly.

STAY MATHEMATICALLY FIT! DO LOTS OF EXERCISES! Practice! Do suggested exercises! Work on examples from class to see if you understand how to solve them on your own. Mathematics is not a subject where last-minute memorization is enough to succeed. The more time you spend actually **doing math**, the stronger your results, understanding, and problem-solving skills will be.

USE THE TEXTBOOK! *Vector Spaces First: An Introduction to Linear Algebra, 4th ed* by Thierry Giordano, Barry Jessup, and Monica Nevins.

The textbook is available for free download (in pdf format) from:

<http://hdl.handle.net/10393/43955> (English).

<http://hdl.handle.net/10393/43956> (français).

ASK FOR HELP! Ask for help when you need it (before things become too overwhelming). Talk to your instructor and TA. We are here to help. Don't be afraid to ask questions during lectures and DGDs. Use the Math Help Centre and your professor's office hours.

VISIT YOUR PROFESSOR'S OFFICE HOURS! Whenever you need concepts clarified or would like to discuss the course, please drop in to my Office Hours (to be announced in Brightspace).

VISIT THE MATH HELP CENTRE! In addition to the DGDs, lectures, and professor's office hours, you can get help for MAT1341 via the Math Help Centre, located in STEM 207. For more details, see <https://www2.uottawa.ca/faculty-science/student-life-services/help-centres>

ACCESSIBILITY 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 accommodation during this course due to a disability, please consult with Academic Accommodation Services as soon as possible: <http://sass.uottawa.ca/en/access>

EQUITY, DIVERSITY & INCLUSION You are welcome here! In this course, all students are welcome, including all races, colours, cultures, ethnicity, genders, sexualities. This course is a space for respect for each other, including students, teaching assistants, staff, and professors.

ZERO-TOLERANCE POLICY ON HARASSMENT: The University of Ottawa, as well as various employee and student groups, offers a variety of services and resources to ensure that all uOttawa community members have access to confidential support and information, and to procedures for reporting an incident or filing a complaint. For more information, see <https://www.uottawa.ca/respect/en/harassment-discrimination-MiniHomePage/harassment>

BILINGUALISM Except in programs and courses for which language is a requirement, all students have the right to produce their written work and to answer examination questions in the official language of their choice (English or French), regardless of the course's language of instruction.

COPYRIGHT The materials you receive for this course are protected by copyright and to be used by you for this course only. You do **not** have permission to upload/share digital copies of course materials. If you require clarification, please consult your professor.

HEALTH AND WELLNESS Are you in need of health and wellness support? For more information on the services and resources available for students please visit <https://www.uottawa.ca/campus-life/health-wellness/getting-help-students>

Important dates for MAT1341G

Thursday, September 5	first LEC
Friday, September 13	first DGD (E01/E02)
Monday, September 16	first DGD (E03/E04)
Monday, September 16	Diagnostic Test (4%)
Tuesday, September 17	last day to enroll in a course (e.g. switch to MAT1339 if diagnostic test goes poorly)
Friday, September 27	Quiz 1 (2%)
Thursday, October 10	MIDTERM EXAM 1 (20%)
October 13–19	reading week break
Friday, November 1	Quiz 2 (2%)
Thursday, November 14	MIDTERM EXAM 2 (20%)
Friday, November 15	last day to withdraw from a course
Friday, November 29	Quiz 3 (2%)
Friday, November 29	Last DGD (E01/E02)
Monday, December 2	Last DGD (E03/E04)
Tuesday, December 3	last LEC
December 5–18, 2024	FINAL EXAM PERIOD

How you will be evaluated

Diagnostic worth 4%: The diagnostic test will be done on Brightspace. You may take the test on your computer anytime during the test day. Once you have started, you will have 75 minutes to complete it. The purpose of the test is to give you feedback on your knowledge of the prerequisite material, such as writing equations of lines and planes, finding the intersection of lines and/or planes, and so on. We will review these materials in the first week of lectures. If you score less than 60% in the test, it is advised that you consider taking MAT1339 instead.

Diagnostic Test worth 4%: Monday, September 16, 2024

3 Quizzes worth 6%: The quizzes will be available from 7:00 am until 11:59 pm (via Brightspace). Students may choose to write their quiz at any point during the window of availability. You may consult your notes while writing a quiz. They will be on the following three dates:

Quiz 1 worth 2%: Friday, September 27, 2024,
for ~ 15 minutes between 7:00 am and 11:59 pm

Quiz 2 worth 2%: Friday, November 1, 2024,
for ~ 15 minutes between 7:00 am and 11:59 pm

Quiz 3 worth 2%: Tuesday, November 26, 2024,
for ~ 15 minutes between 7:00 am and 11:59 pm

2 Midterms worth 40% : The midterm exams will be **closed-book exams**, written in class on the following two dates:

Midterm 1 worth 20%: Thursday, October 10, 2024, 13:00 – 14:20

Midterm 2 worth 20%: Thursday, November 14, 2024, 13:00 – 14:20

Final Exam worth 50%: There will be a **cumulative closed-book 3-hour Final Exam**, scheduled by the Faculty during the Exam Period (December 5–18, 2024). Regulations for final examinations at the University of Ottawa can be found [here](#).

Additional Course Evaluation Policies:

- ★ If your mark on the Final Exam is lower than 40%, then you will fail the course (F), regardless of your other marks.
- ★★ If your mark on the Final Exam is higher than your grade on one or both of the midterm exams, then the weight of each such midterm will be transferred to the weight of the final exam (whenever it is to your advantage).

Midterm and Final Exam Policies

Exam procedures: You should bring your student card to exams. Students may not enter after or leave before 20 minutes have passed from the beginning of an exam.

Calculator policy: **NO CALCULATORS.** You may **not** use calculators during midterms or the exam. If you are caught with a calculator during a test or the exam, then academic fraud allegations may be filed which may result in you obtaining zero on the test/exam.

Policy for missing a quiz: If you miss a quiz, or if you perform better on the final exam, then the weight of your missed quiz will be transferred to the weight of the final exam.
There are no make-up quizzes.

- Policy for missing a midterm:** If you miss a midterm, or if you perform better on the final exam, then the weight of your missed midterm will be transferred to the weight of the final exam. **There are no make-up midterms.**
- Unauthorized items:** Cellular phones, electronic devices, calculators or course notes are **not** allowed during midterms and final exams. Phones and devices (including Smartwatches) 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.

Diagnostic Test: This test covers topics corresponding to the algebra and geometry in the course MCV4U, and will be briefly reviewed during the first three lectures of MAT1341.

- The diagnostic test will be available as a Brightspace Quiz from 7:00 am until 11:59 pm on Wednesday, January 17.
- You will have 60 minutes to answer the questions and submit your Quiz.
- Do not click “Start” until you are ready to complete the quiz.
- To be specific, for the Diagnostic test, you’ll need to know how to do the following in 2- or 3-space:
 - find the equation of a line
 - find the equation of a plane
 - find the intersection of two lines
 - find the intersection of two planes
 - find the intersection of a line and a plane
 - use the cross product to find the normal vector of a plane
 - use the cross product to find the area of a triangle
 - use the dot product to find the angle between two vectors
 - use the dot product to find the magnitude of a vector
 - find the projection of one vector onto another
 - find the distance between a point and a plane
 - find the distance between a point and a line
 - find the volume of a parallelepiped
- It is **expected** that students should do well on the diagnostic test. Even if you find the diagnostic test easy and you get a high grade, this **does not mean you will find the rest of MAT1341 easy** – MAT1341 covers more abstract concepts than what you saw in high school, and the material in MAT1341 is covered at a faster pace and at a university level.
- If you do poorly on the diagnostic test, you may need to consider dropping MAT1341 and registering for the course MAT1339. Please note: the last day to enroll in a course is January 19.

Academic Integrity. Academic integrity means being responsible for the quality of your work, preparing it honestly, and respecting the intellectual community you are part of as a student. Every member of the University community has the moral obligation to learn and share knowledge with honesty and integrity. For more information, please see <https://www2.uottawa.ca/about-us/provost/academic-integrity>

Academic Fraud. Academic fraud refers to “an act by a student that may result in false academic evaluation of that student or another student”. Plagiarism and all forms of cheating are taken very seriously at the University of Ottawa. Please take the time to see <https://www2.uottawa.ca/about-us/policies-regulations/academic-regulation-i-14-academic-fraud>

Tentative Schedule	textbook sections and topics
Week 1	
Sep. 5	Ch. 2 Vector geometry
Week 2	
Sep. 10	Ch. 3 Lines and planes
Sep. 12	Ch. 4 Vector spaces
Week 3	
Sep. 16	Diagnostic Test
Sep. 17	Ch. 5 Subspaces and spanning sets
Sep. 19	Ch. 6 The span of vectors in a vector space
Week 4	
Sep. 24	Ch. 7 Linear dependence and independence
Sep. 26	Ch. 8 Linear independence and spanning sets
Sep. 27	Quiz 1
Week 5	
Sep. 30	Ch. 9 Basis and dimension
Oct. 3	Ch. 10 Dimension theorems
Week 6	
Oct. 7	Ch. 11 Solving systems of linear equations
Oct. 10	Midterm 1
Oct. 13 – 19	Reading Week
Week 7	
Oct. 22-24	Ch. 12 Solving systems of linear equations, continued Ch. 13 Applications of solving linear systems Ch. 14 Matrix multiplication
Week 8	
Oct. 29-31	Ch. 15 Vector spaces associated to matrices Ch. 16 The row and column space algorithms Ch. 17 Bases for finite-dimensional vector spaces
Nov. 1	Quiz 2
Week 9	
Nov. 5-7	Ch. 18 Matrix inverses Ch. 19 Orthogonality, Gram-Schmidt Algorithm
Week 10	
Nov. 12	Ch. 20 Orthogonal complements and applications Ch. 1 Complex numbers
Nov. 14	Midterm 2
Week 11	
Nov. 19-21	Ch. 21 Determinants Ch. 22 Eigenvalues and eigenvectors
Week 12	
Nov. 26	Ch. 23 Diagonalizability
Nov. 28	Ch. 24 Linear transformations
Nov. 29	Quiz 3
Week 13	
Dec. 3	Ch. 24 Linear transformations - continued
December 5–18	Exam Period