

Math 2522 Section B Applied Linear Algebra

Fall 2023

Course Overview:

MATH 2522. Applied Linear Algebra. 3 Credits.

Vectors, matrices, linear independence, vector spaces (with focus on real n -space), determinants, linear transformations, eigenvalues and eigenvectors. Applications from engineering and the sciences incorporated through required computer assignments. Credit not given for both MATH 2522 and MATH 2544. Prerequisite: MATH 1248 or MATH 1242. Catamount Core: MA, QR.

Learning Outcomes:

After successfully completing this course, the student will be able to:

1. Solve systems of linear equations with applications using Gauss Jordan elimination and matrix inverse.
2. Perform basic operations on vectors, inverses, and determinants.
3. Determine if a set of vectors is linearly independent and whether it forms a basis for a vector space.
4. Learn how to find eigenvalues and eigenvectors with an application to Markov chains.
5. Use Matlab to solve basic linear algebraic problems.

Materials:

WebAssign access for *Linear Algebra with Applications*, 9th edition, by Garreth Williams. WebAssign includes access to the e-text of the textbook as well as homework exercises.

Optional: Print copy of the book: *Linear Algebra with Applications*, 9th edition, by Garreth Williams.

Notetaking:

My Course Notes are available as a pdf on Blackboard in the Course Materials folder. The course is based almost entirely on these Notes. They cover 95% of what I present in class. You can use these notes instead of copying everything I write on the board so that you can listen and absorb the material better during class. The # 1 thing you can do to succeed in this class is to read the Course Notes outside of class, preferably before the class where the material is presented.

Class time: The class meets 9:40am- 10:30am M W F in Cohen 119

Please refrain from using cell phones during class.

Attendance: Attendance is required. In accordance with University Policy, I allow students to miss classes due to religious observances, varsity sporting matches or any other activities stated in the UVM attendance policy. You must email me ahead of time telling me that you will be absent. If you will be absent, plan to ask a peer about what was covered in class. In borderline final letter grade situations, your attendance and participation may help your grade.

Instructor Information:

Name: Dr. Dan Hathaway

Email : Daniel.Hathaway@uvm.edu *Include Math 2522 B in the subject line

Office: Innovation Bldg, Room 311

Office Hours:

MWF 10:50 am to 11:50 AM in Innovation Bldg, Room 311

Please feel free to email me to set up an appointment at another time if you have class during these office hours.

Students are always welcome to ask me questions before or after class or send me an email for a fast response.

Brightspace:

Brightspace will be used for Announcements, grades, and the final exam.

Homework:

Weekly homework is assigned to be completed in WebAssign. (www.webassign.net).

You will need our class key: uvm 6417 7646

Weekly homework will be posted on Webassign on Fridays and due the following Thursday on Webassign. Each homework will count the same amount and **the one lowest grade will be dropped**. Use the one dropped homework assignment wisely to cover any absences for university events, illness, family emergencies, funerals, and workload issues.

You have a maximum of 5 attempts per problem.

WebAssign Extension Policy: You may request an automatic extension through WebAssign. The request for an automatic extension must be made within 2 days of the assignment due date. An automatic extension extends the assignment due date by 2 days from when the request is made. Automatic extensions carry a penalty of 30% on the work that is late. *Extensions are not permitted if you have already viewed the Answer Key.* No manual extensions will be granted.

Matlab Assignments:

There will be Matlab projects assigned periodically and posted on Brightspace. Matlab is available on the UVM CEMS computers. I assume that you have no prior experience with Matlab. You can download Matlab to your computer (for free):

https://www.uvm.edu/cems/installing_matlab_students

Submission problems are not an excuse for lateness. Check that your submissions are visible to you and you can open and read the files. You may collaborate with others, but you must submit your own code, answers, and analysis. If you write a script, that must be submitted also.

Once you have mastered it, Matlab is a skill you can add to your resume in preparation for your career.

Quizzes: There will be 6 quizzes and the lowest 2 will be dropped. Blackboard keeps track of the lowest 2 quiz grades and drops them throughout the quarter. **Use the 2 dropped quizzes wisely to**

cover any absences for university events, illness, family emergencies, funerals, and workload issues. No make up quizzes. **Be prepared for quizzes typically on Wednesdays.** No notes, books, calculators or electronic devices may be used on the quizzes. I will announce quizzes ahead of time on Brightspace.

Midterm Exams: There will be 2 midterm exams. The dates of the midterms are **Wednesday, Sept 27 and Friday, Nov 3.** You may bring one 3 inch by 5 inch notecard filled front and back to the first midterm exam and two 3 inch by 5 inch notecards filled front and back to the second midterm exam. Each test is **cumulative** from the beginning of the course. No books, calculators or electronic devices. No make-up exams.

Final Exam: There will be a **cumulative** final exam given at the end of the semester. The final exam will be **held Monday, Dec 11 at 7:30am (until 10:15 am)** in our usual classroom. You may bring three 3 x 5 inch cards filled front and back to the final exam. No books, calculators or electronic devices. No makeup exams.

On ALL exams and labs, you MUST show all your work, justify your answers and simplify as much as possible to get full credit. If you do not answer a True/False question on an exam, you will not get credit for it.

Computation of grade:

Homework 13%

Matlab Projects: 7%

Quizzes: 10%

Midterm1: 22%

Midterm2: 23%

Final Exam: 25%

Point Values for Final Grades:

A+	97–100%
A	93–96%
A-	90–92%
B+	87–89%
B	83–86%
B-	80–82%
C+	77–79%
C	73–76%
C-	70–72%
D+	67–69%
D	63–66%
D-	60–62%
F	< 60%

Tutoring Center:

The Tutoring Center is free to all undergraduate students. To schedule an appointment, go to their website: https://www.uvm.edu/academicsuccess/tutoring_center

Technical support for students:

Students should contact the Helpline (802-656-2604) for support with technical issues.

Math 2522			
	Course Schedule Detail	Fall 2023	Note: Subject to Change
Week #	Monday	Weds	Friday
1	Matrices and Systems of Linear Equations	Echelon Form and Gauss-Jordan Elimination	Echelon Form and Gauss-Jordan Elimination
2	No School	Start Vector Space R^n	Finish The Vector Space R^n
3	Subspaces of R^n	Start Linear Independence	Finish Linear Independence; Start Bases and Dimension
4	More Bases and Dimension	Finish Bases and Dimension	Curve Fitting and Traffic Flow; Start Matrices
5	Review for Midterm	Midterm #1	Go Over Exam; Start Matrix Multiplication
6	Finish Matrix Multiplication	Start Symmetric Matrices	Finish Symmetric Matrices; Started Inverse
7	More Matrix Inverses	Finish Matrix Inverses; Start Matrix Transformations	No School
8	More Matrix Transformations	Finish Matrix Transformations; Start Linear Transformations	Finish Linear Transformations
9	Homogeneous Coordinates and Computer Graphics; Start Markov Chains	Finish Markov Chains	DiGraphs and start Determinants
10	Finish Determinants	Review for Midterm #2	Midterm #2
11	Properties of Determinants	Determinants, Matrix Inverses, and Systems of Linear Equations	Eigenvalues
12	More Eigenvalues	Leslie Matrices	Eigenvalues by Iteration
	No School	No School	No School
13	Column Space and Rank	Finish Rank Nullity Theorem; Start 1:1 Transformations	Finish Dot Product /Diagonalization
14	Jeopardy!	Review for Final Day 1	Review for Final Exam Day 2

The following are General Policies from UVM and CEMS:

Additional Information on Attendance and Illness:

If a student will not be able to attend in-person classes for qualifying health reasons, Student Health Services (SHS) will send a notification to the appropriate student services office or designated staff member informing them of this along with the dates the student is unable to attend. The SHS notification will specify whether the request for flexibility is only around in-person class attendance or includes additional flexibility for assignments and tests because the student is too ill to participate. Students are responsible for working with their faculty to make up class content and work they miss due to a documented illness.

Inclusion Statement:

Our intention is for CEMS to be a place where you will be treated with respect and kindness. We welcome individuals of all ages, backgrounds, beliefs, interests, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of the College are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the community. If you ever feel that you have been unfairly treated or judged by an instructor, a mentor, another student, or another member of the CEMS community, please let someone know. Your instructors and advisors in the [CEMS Office of Student Services](#) are available to discuss any concerns or you can report an incident of bias through the [Campus Bias Response Program](#).

UVM Land Acknowledgement:

The campus of the University of Vermont sits within a place of gathering and exchange, shaped by water and stewarded by ongoing generations of Indigenous peoples, in particular the Western Abenaki. Acknowledging the relations between water, land, and people is in harmony with the mission of the university. Acknowledging the serious and significant impacts of our histories on Indigenous peoples and their homelands is a part of the university's ongoing work of teaching, research, and engagement and an essential reminder of our past and our interconnected futures for the many of us gathered on this land.

UVM respects the Indigenous knowledge interwoven in this place and commits to uplifting the Indigenous peoples and cultures present on this land and within our community.

Lived Name and Pronoun Information:

The UVM Directory includes fields for indicating your lived name and your pronouns. Lived names (preferred names, names in use) are names that an individual wants to be known by in the University community. Entering your pronouns is strongly encouraged to help create a more inclusive and respectful campus community. To update your information, login to the UVM Directory. A preview box will allow you to see how this information will appear in other systems used on campus such as Microsoft Teams and Brightspace.

More information about how to make changes to your lived name and pronouns is available in the [Knowledge Base](#).

To read more about official UVM policies, events, and initiatives regarding diversity, equity, and inclusion: <https://www.uvm.edu/diversity>

Research and Citation Help:

For help selecting research topics, finding information, citing sources, and more, ask a librarian. The UVM Libraries are eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.

Howe Library: <https://library.uvm.edu/askhowe>

Dana Medical Library: <https://dana.uvm.edu/help/ask>

Silver Special Collections Library: <https://specialcollections.uvm.edu/help/ask>

Career Readiness Skills:

Questions on how to incorporate coursework on your resume? Please visit the [Career Readiness Program's Resume & Cover Letter page](#).

Course Evaluations:

All students are expected to complete a mid-term evaluation and final evaluation of each course they are enrolled in. The evaluations will be anonymous and confidential, and the information gained, including constructive criticisms, will be used to improve the course.

Students can access Blue course evaluation via Brightspace institutional homepage or by visiting <https://blue.uvm.edu/uvm>. You can also link to the UVM Knowledge Base page with [student instructions on how to access Blue course evaluations](#).

Intellectual Property Statement/Prohibition on Sharing Academic Materials:

Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity. Please note that 'sharing assessments' also includes course materials that students share on study sites such as Chegg and Course Hero.

Tips for Success:

Course-specific study/preparation tips

Here are a few resources for students on remote/online learning:

- Checklist for success [in https://learn.uvm.edu/about/support-for-students/checklist-online-credit-courses/](https://learn.uvm.edu/about/support-for-students/checklist-online-credit-courses/)
- Academic support for online courses: <https://www.uvm.edu/academicsuccess/online-learning-student-resources-remote-instruction>
- 30-minute webinar on online learning success (Mar 2020): https://www.youtube.com/watch?v=Xp_MYsqQyvE

Helpful resources other than the professor (e.g., [Undergraduate/Graduate Writing Center](#), [Supplemental Instruction](#), [Learning Co-op tutors](#), supplemental course materials)

Student Learning Accommodations:

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to

faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with [Disability Related Flexible accommodations](#) will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

Contact SAS:

A170 Living/Learning Center;
802-656-7753
access@uvm.edu
www.uvm.edu/access

Academic Integrity:

The policy addresses plagiarism, fabrication, collusion, and cheating.

<https://www.uvm.edu/policies/student/acadintegrity.pdf>

The Center for Student Conduct has created several modules to help students learn about UVM's Academic Integrity Policy, definitions, and process. The modules include brief readings, videos, quizzes to check knowledge, links to resources, survey on students' beliefs about cheating, discussion board topics and an honor pledge. We encourage you to check out these resources and incorporate some of them into your courses. To preview the modules, self-enroll in the Blackboard Organization (CSC 001: Academic Integrity Faculty Resources). [Click here for directions for self-enrolling](#) or reach out to Deanna Garrett-Ostermiller (dgarett@uvm.edu) to request a zip file and instructions for importing into your Blackboard course. Information on the Academic Integrity Process for faculty can be found in the CEMS TEACH MS Team / Resources channel or by request. Contact Courtney Giles (cdgiles@uvm.edu) or Priyantha Wijesinghe (pwijesin@uvm.edu).

Code of Student Conduct:

[UVM's Code of Student Conduct](#) outlines conduct expectations as well as students' rights and responsibilities.

FERPA Rights Disclosure:

The purpose of UVM's [FERPA Rights Disclosure](#) is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

Final Exam Policy:

The University [final exam policy](#) outlines expectations during final exams and explains timing and process of examination period.

Grade Appeals:

If you would like to contest a grade, please follow the procedures [outlined in this policy](#).

Grading:

[This link](#) offers information on grading and GPA calculation.

Religious Holidays:

Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time. The complete policy is [here](#).

Promoting Health & Safety:

The University of Vermont's number one priority is to support a healthy and safe community:

[Center for Health and Wellbeing](#)

[Counseling & Psychiatry Services \(CAPS\)](#) Direct Phone Line: (802) 656-3340

C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by [visiting the C.A.R.E. Team website](#).

Food Insecurity: The UVM Center for Health & Wellbeing provides several on- and off-campus resources for students struggling with food insecurity: <https://www.uvm.edu/health/food-insecurity-uvm>

General statement regarding potential changes during the semester:

<http://catalogue.uvm.edu/>

The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

Statement on Alcohol and Cannabis in the Academic Environment:

As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

Cause issues with attention, memory and concentration

Negatively impact the quality of how information is processed and ultimately stored

Affect sleep patterns, which interferes with long-term memory formation

It is my expectation that you will do everything you can to optimize your learning and to fully participate in this course.