UCONN
UNIVERSITY OF CONNECTICUT

Math 2210Q

Applied Linear Algebra

Spring 2025

Excluding materials for purchase, syllabus information may be subject to change. The most up-to-date syllabus is located within the course in HuskyCT.

Course and Instructor Information

Course Title: Applied Linear Algebra

Credits: 3

Mode/Format: In-Person

Prerequisites: MATH 1132Q or 1152Q or 2142Q. Recommended preparation: a grade of C- or better in MATH 1132Q. May not be taken out of sequence after passing MATH 2144Q, 3210, 3510, or 3710. Repeat restrictions apply. See advising.uconn.edu/repeat-policy for information.

Instructor: Benjamin York (You can call me Mr. York or Ben)

Pronouns: he/him

Email: benjamin.york@uconn.edu

Office: MONT 119

Office Hours/Availability: Mondays 1-2pm, Wednesdays 2-3 pm, Thursdays 2-3pm, or by appointment

IMPORTANT NOTICE ON ONLINE LECTURES

I am a graduate student in my last year of study, which means I am actively looking for jobs as well as finishing my Ph.D. thesis. As such, there may be times where I will be unable to hold class due to job interviews, conference travel, or other obligations. In this case, I will be recording online lectures and posting them to HuskyCT. I apologize in advance for any disruption this may cause, but will be sure to give as much advanced notice as possible.

Course Materials

There is no required textbook for this course. However, I recommend using David C. Lay's *Linear Algebra and Its Applications* as a reference. Feel free to get a cheap version (physical or digital) of anything from the 3rd edition onwards.

Course Description

Systems of equations, matrices, determinants, linear transformations on vector spaces, characteristic values and vectors, from a computational point of view. The course is an introduction to the techniques of linear algebra with elementary applications.

Course Objectives

The goal for the semester is to learn, understand and be able to work with the main ideas of linear algebra, including systems of linear equations, matrices, vector spaces (concrete and abstract) and their bases, linear transformations and change of basis matrices, eigenvectors and eigenvalues, various matrix factorizations, and the applications of these ideas. This means that you should not only be able to work through problems like those seen on the problem sets, but also that you should have the ability to articulate the ideas presented in the course in a clear and coherent manner. You should be able to apply the theory in new and imaginative ways. This course will have concrete and abstract components. Being able to explain why something is true will constitute a significant part of the course.

Course Outline

- Chapter 1: Linear Equations in Linear Algebra, 1.1-1.5, 1.6-1.9, 3 weeks.
- Chapter 2: Matrix Algebra, 2.1-2.3, 2.5, 2 weeks
- Chapter 3: Determinants, 3.1-3.3, 1 week
- Chapter 4: Vector Spaces, 4.1-4.7, 2.5 weeks
- Chapter 5: Eigenvalues and Eigenvectors, 5.1-5.4, 1.5 weeks
- Chapter 6: Orthogonality and Least Squares, 6.1, 6.2, 6.4, 6.5, 2 weeks
- Chapter 7: Symmetric Matrices and Quadratic Forms 7.1-7.4, 1.5 weeks

Course Requirements and Grading

Category	Overview	Weighting
Homework	Due on Gradescope each Friday	25%
Midterm Exams	3 Exams will be given during the semester	15%, 20%, 25%, ordered by performance
Final Exam	1 Exam during finals week	15%
Projects	Optional, must sign up in advance	Extra Credit

Exams

There are three midterm exams and a final exam. The exams are:

- Friday, Feb. 14th, 2025, covering Chapter 1
- Friday, March 14th, 2025, covering Chapters 2, 3 and 4.1-4.3
- Friday, April 18th, 2025, covering Chapters 4, 5 and 6.1-6.2
- Final Exam, Date TBA, Chapters 6 & 7

For the midterm exams, your best exam score will be worth 25%, your second best will be worth 20%, and your third best will be worth 15%. The final exam is worth 15%.

For additional information on undergraduate grading policies see here: https://registrar.uconn.edu/grades/

Grading Scale:

Grade/ Points Earn	Letter Grade	GPA
93-100	A	4.0
90-92.9	A-	3.7
87-89.9	B+	3.3

83-86.9	B	3.0
80-82.9	B-	2.7
77-79.9	C+	2.3
73-76.9	C	2.0
70-72.9	C-	1.7
67-69.9	D+	1.3
63-66.9	D	1.0
60-62.9	D-	0.7
<60	F	0.0

Homework and Late Policy

Homework assignments will be **due each Friday at 11:59 pm** (see the Course Schedule below for more details). They will take the form of Worksheets or Practice Problems depending on the week. Homework assignments **may be turned in the Sunday after they are due** for a **10% penalty.** If you are unable to submit an assignment by the late due date and would like an extension, please reach out to me in advance, or within 24 hours of the late due date.

Worksheets

Worksheets are longer form homework assignments and consist of **6 problems** covering the previous week's material. Each worksheet will be **worth 20 points**. Five of the problems on the worksheet will be graded for effort, where a good score will be given to work that demonstrates a sincere attempt at the problem. The final problem will be graded for correctness and will receive detailed feedback. The problem that is graded for correctness will be chosen randomly each week.

Practice Problems

Practice Problem Sets will be shorter than worksheets and will consist of **5-10 short problems** taken from the past several weeks' worth of material. Each problem set will be **worth 10 points** each and be graded for completion. These assignments are meant to refresh your understanding of past weeks' material and will be assigned after midterm exams.

There will also be a brief assignment introducing yourself to me and setting your expectations for the course. This introductory assignment will be worth **10 points.**

Make-Up Exam Policy

If you miss a midterm exam because you are ill or due to some other extenuating circumstance, you must contact me before the original exam time, or within 24 hours after the original exam time. If you receive approval for a makeup midterm, then you must take the midterm within 1 week of the original midterm time. If you do not follow these procedures, then you will receive a score of zero on the midterm unless you have proper documentation of an extenuating circumstance.

Feedback and Grades

I will make every effort to provide feedback and grades within one week. (Exams will be returned one week after they are taken to allow time for make-ups). To keep track of your performance in the course, refer to My Grades in HuskyCT.

Weekly Time Commitment

You should expect to dedicate 9 to 12 hours a week to this course. This expectation is based on the various course activities, assignments, and assessments and the University of Connecticut's policy regarding credit hours. (More information related to hours per week per credit can be accessed at the Online Student website).

Extra Credit Projects

Toward the end of the semester, you will have the option to give a short (~10 min.) presentation on a subject in linear algebra that was not explored in the class. This may be about pure or applied linear algebra. If you wish to do so, you should first submit a proposal to me for approval. If approved, we will then schedule a time for you to present to me. More details will come as the end of the semester approaches.

Additional Work

I will occasionally post practice problems/worksheets, or practice exams on HuskyCT. These are for your own benefit; they are not necessary to do and will not be graded.

Students with Disabilities

The University of Connecticut is committed to protecting the rights of individuals with disabilities and assuring that the learning environment is accessible. Students who require accommodations should contact the Center for Students with Disabilities, Wilbur Cross Building Room 204, (860) 486-2020 or http://csd.uconn.edu/.
If you have CSD accommodations and wish to use them for an exam, please contact the CSD center to schedule your exam there. Exams taken in class will last for the full class period, and only the class period.

How to Succeed in this Course

The best way to succeed in a class of this level is to focus on two things. (1) You must really understand the material and, in particular, all of the course's vocabulary. This class uses more dedicated terminology than most of your previous math courses. (2) You must be able to apply what you have learned to solving new problems. The best way to do this is to practice. Try solving new problems on your own. Do not immediately look at the solutions. It's OK to be stuck for a while. Getting yourself unstuck is a great way to learn. Try some things that don't work. Think about the problem in a different way. Look back at the definitions. Walk around for a few hours. Then try again.

Please attend class whenever possible. I want to create an active learning environment in the classroom that works best when there are people there. In class, actively participate. Ask questions! Let me know what you are thinking and if you feel lost.

Throughout the semester, it is normal to run into challenges in this course. These might be compounded by outside stressors. It is sometimes difficult to find the balance between using challenges as an opportunity to push yourself and knowing when to take a step back for your personal health and wellbeing. Reach out! I am here to help you navigate the challenges in the course. You may also consider reaching out to the various support offices on campus, listed below.

Dean of Students Office, Academic Achievement Center, Writing Center, Quantitative Learning Center, Center for Students with Disabilities, Title IX Office, Student Health and Wellness -- Mental Health

Course Schedule

Class Dates	Assignments/Exams
Week 1: January 22 & 24	**Friday, January 24 at 11:59 pm:** Introductory Assignment Due
Week 2: January 27, 29 & 31	**Friday, January 31 at 11:59 pm:** Worksheet 1 Due
Week 3: February 3, 5 & 7	**Friday, February 7 at 11:59 pm:** Worksheet 2 Due
Week 4: February 10, 12 & 14	**Friday, February 14 at 11:59 pm:** Worksheet 3 Due **In Class Friday, February 14:** **Midterm Exam 1**

Week 5: February 17, 19 & 21	**Friday, February 21 at 11:59 pm:** Practice Problem Set 1 Due
Week 6: February 24, 26 & 28	**Friday, February 28 at 11:59 pm:** Worksheet 4 Due
Week 7: March 3, 5 & 7	**Friday, March 7 at 11:59 pm:** Worksheet 5 Due
Week 8: March 10, 12 & 14	**Friday, March 14 at 11:59 pm:** Worksheet 6 Due **In Class Friday, March 14:** **Midterm Exam 2**
Week 9: SPRING BREAK: MARCH 16 - 22	**Friday, March 14 at 11:59 pm:** Practice Problem Set 2 Due
Week 10: March 24, 26 & 28	**Friday, March 28 at 11:59 pm:** Worksheet 7 Due
Week 11: March 31, April 2 & 4	**Friday, April 4 at 11:59 pm:** Worksheet 8 Due
Week 12: April 7, 9 & 11	**Friday, April 11 at 11:59 pm:** Worksheet 9 Due
Week 13: April 14, 16 & 18	**Friday, April 18 at 11:59 pm:** Worksheet 10 Due **In Class Friday, April 18:** **Midterm Exam 3**
Week 14: April 21, 23 & 25	**Friday, April 25 at 11:59 pm:** Practice Problem Set 3 Due
Week 15: April 28 & 30, May 2	**Friday, May 2 at 11:59 pm:** Worksheet 11 Due
Week 16: FINALS WEEK	Final Exam Time and Date TBA

Importance of Inclusivity

Throughout this course, you will be asked to interact with me and your classmates in different ways. Through these interactions, it is important to be mindful of the diversity of background and experience each of us brings to the class. I will do my best to ensure each student in the class has equitable access to the course material as well as to opportunities to earn credit. I ask when you are working with other students you create a good environment for your classmates. This might take the form of using someone's preferred pronouns, acknowledging differences in learning styles or background knowledge, or respecting someone's choice to maintain physical

distance in the classroom space. If at any time you feel that you or someone around you is not being treated respectfully, please do not hesitate to let me know.

Resources for Students Experiencing Distress

The University of Connecticut is committed to supporting students in their mental health, their psychological and social well-being, and their connection to their academic experience and overall wellness. The university believes that academic, personal, and professional development can flourish only when each member of our community is assured equitable access to mental health services. The university aims to make access to mental health attainable while fostering a community reflecting equity and diversity and understands that good mental health may lead to personal and professional growth, greater self-awareness, increased social engagement, enhanced academic success, and campus and community involvement.

Students who feel they may benefit from speaking with a mental health professional can find support and resources through the **Student Health and Wellness-Mental Health** (SHaW-MH) office. Through SHaW-MH, students can make an appointment with a mental health professional and engage in confidential conversations or seek recommendations or referrals for any mental health or psychological concern.

Mental health services are included as part of the university's student health insurance plan and also partially funded through university fees. If you do not have UConn's student health insurance plan, most major insurance plans are also accepted. Students can visit the **Student Health and Wellness-Mental Health located in Storrs on the main campus in the Arjona Building, 4th Floor,** or contact the office at **(860) 486-4705, or https://studenthealth.uconn.edu/** for services or questions**.**

Accommodations for Illness or Extended Absences

Please stay home if you are feeling ill and please go home if you are in class and start to feel ill. If illness prevents you from attending class, it is your responsibility to notify me as soon as possible. You do not need to disclose the nature of your illness; however, you will need to work with me to determine how you will complete coursework during your absence.

If life circumstances are affecting your ability to focus on courses and your UConn experience, students can email the Dean of Students at dos@uconn.edu to request support. Regional campus students should email the Student Services staff at their home campus to request support and faculty notification.

Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. Review these important standards, policies and resources, which include:

- The Student Code
  - Academic Integrity
  - Resources on Avoiding Cheating and Plagiarism
- Copyrighted Materials
- Credit Hours and Workload
- Netiquette and Communication
- Adding or Dropping a Course
- Academic Calendar
- Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships
- Sexual Assault Reporting Policy

Software/Technical Requirements

The software/technical requirements for this course include:

- HuskyCT/Blackboard (HuskyCT/ Blackboard Accessibility Statement, HuskyCT/ Blackboard Privacy Policy)
- PDF reading software, such as Adobe Acrobat Reader
- Microsoft Office (UConn Microsoft Products) (Microsoft Accessibility Statement, Microsoft Privacy Statement)
- Dedicated access to high-speed internet with a minimum speed of 1.5 Mbps (4 Mbps or higher is recommended)

Privacy Statement: For information on managing your privacy at the University of Connecticut, visit the University's Privacy page. NOTE: This course has NOT been designed for use with mobile devices.

Help

Technical and Academic Help provides a guide to technical and academic assistance.

This course uses the learning management platform, HuskyCT. If you have difficulty accessing HuskyCT, you have access to the in person/live person support options available during regular business hours through the Help Center. You also have 24x7 Course Support including access to live chat, phone, and support documents.

Minimum Technical Skills

To be successful in this course, you will need the following technical skills:

- Use electronic mail with attachments.
- Save files in commonly used word processing program formats.
- Copy and paste text, graphics or hyperlinks.
- Work within two or more browser windows simultaneously.

- Open and access PDF files.

Evaluation of Course Experience

Students will be given an opportunity to provide feedback on their course experience and instruction using the University's standard procedures, which are administered by the Office of Institutional Research and Effectiveness (OIRE).

The University of Connecticut is dedicated to supporting and enhancing teaching effectiveness and student learning using a variety of methods. The Student Evaluation of Teaching (SET) is just one tool used to help faculty enhance their teaching. The SET is used for both formative (self-improvement) and summative (evaluation) purposes.

Additional informal formative surveys and other feedback instruments may be administered within the course.