UCONN

DEPARTMENT OF MATHEMATICS
Álvaro Lozano-Robledo

MATH 2210Q – Applied Linear Algebra – 002

This page contains specific information for Section 002 of MATH 2210Q – Applied Linear Algebra. Below you can find the formal course description, information about the instructor, enrollment, the book, homework and quizzes, exams, and policies.

Course Description:

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.

Prerequisites: MATH 1132, 1152, or 2142. Recommended Preparation: a grade of C- or better in MATH 1132. Not open for credit to students who have passed MATH 3210.

Meets: TuTh 12:30- 1:45 at MONT 421.

About the Instructor: Álvaro Lozano-Robledo

I'm a Professor of mathematics at the University of Connecticut in the Department of Mathematics.

Office hours: Mondays 1-2pm (online — link in HuskyCT), Thursdays 3:30-4:30pm at MONT 233, or by appointment.



About the Book and Other Resources:

Alvaro Lozano-Robledo in action (Shawn Kornegay/UConn Photo), see this UConn Today's article.

The book for this course is "Linear Algebra & Its Applications", 6th Edition, David C. Lay.

Other resources:

- Gilbert Strang's (MIT) Linear Algebra course. In particular, the video lectures are excellent.
- Tom Roby's (UConn) Applied Linear Algebra course with video lectures (see the outline here, and the videos here).
- A Q Center video on matrix row reduction.
- Sites on examples of applications of linear algebra:
  - ~~Why study linear algebra~~ (link works)
  - Applications of linear algebra
  - Linear algebra and Netflix
  - How to take a good picture of a teapot (a video-example of principal component analysis)
  - Orthogonality and the US Supreme Court (skip to minute 22:15).
- CoCalc.com (either create an account [recommended] or simply click on "Try CoCalc Now!" to start a session).
  - Sage/CoCalc commands for linear algebra: Sage for Linear Algebra by Robert A. Beezer.

Homework:

Homework will be assigned using MyMathLab (MML).

- Your book will come with a MML code, and then you can register using these instructions.
- If you need TECH support, please follow these instructions for MML support.

In addition, there are book problems below that are suggested for you to practice on your own.

Exams and Class Grade:

There will be two in-class midterms and a final exam. Each midterm will cover about 6 weeks of material, while the final will be cumulative.

- **Midterm 1 will be on Thursday Feb 26th, in-class**.
  - Covers everything we covered from Chapters 1 and 2.
  - Chapter 1-2 highlights.
  - Practice problems for Midterm 1.

- Solutions for practice problems for Midterm 1.
- Midterm 1 solutions.

- **Midterm 2 will be on Thursday April 16, in-class.**
  - Covers (concentrates on) material in Chapters 3 and 4.
  - Chapters 3-4 highlights.
  - Practice problems for Midterm 2.
    - Solutions for practice problems.
  - An exam-type question.
  - Midterm 2 solutions.
- **Final Exam will be on TBD.** See the registrar website to confirm.
  - The final exam will be cumulative but concentrates on material from Chapters 5 and 6.
  - Chapters 5-6 highlights.
  - Practice problems for Final Exam.
    - Solutions for practice problems.
  - Final exam solutions

The total grade will be computed as follows:

Homework		100
Exam 1: (TBD)	In class	100
Exam 2: (TBD)	In class	125
Final Exam: (TBD)		175
TOTAL:		500

Course Outline:

Week	Topics	Exercises
1	1.1 Systems of Linear Equations.	#1,8,13,14,17,20
	1.2 Row Reduction and Echelon Forms.	#1,3,7,12,14,20
2	1.3 Vector Equations.	#1,3,6,9,13,14,15,21

	1.4 The Matrix Equation Ax=b.	#1,4,7,9,13,19,22
	1.5 Solutions Sets of Linear Systems.	#2,5,11
3	1.7 Linear Independence.	#1,5,8,9,15,20,22
	1.8 Introduction to Linear Transformations.	#1,8,9,13
	1.9 The Matrix of a Linear Transformation.	#1,2,15,20
4	2.1 Matrix Operations	#2,5,7,10
	2.2 Inverse of a Matrix	#3,6,29,31,32,33
	2.3 Characterizations of Invertible matrices	#2,4,6,8,11
5	2.5 Matrix Factorizations	#2,4,6,8,10,12
	3.1 Introduction to Determinants	#4,11,15,16,37
	3.2 Properties of Determinants	#4,7,8,21,22
6	**Review and Exam I**	
7	4.1 Vector Spaces and Subspaces	#1,6,7,8,9,11
	4.2 Null Spaces, Columns Spaces, and Linear Transformations	#3,11,12,14,17,21,23
8	4.3 Linearly Independent Sets; Bases	#3, 4, 9, 13, 15, 16, 19, 23
	4.4 Coordinate Systems	# 1, 3, 5, 6, 9, 10, 13, 14
	4.5 Dimension of a Vector Space	#1, 4, 9, 11, 17, 18

9	**SPRING BREAK**	
10	4.6 Rank	#1, 2, 5, 6
	5.1 Eigenvalues and Eigenvectors	#2, 4, 13, 15, 16, 17
	5.2 The Characteristic Equation	#2, 4, 9, 10, 12
11	5.3 Diagonalization	#7, 8, 9, 11
	5.4 Eigenvectors and Linear Transformations	#6, 9, 11, 13, 17
12	6.1 Inner Product, Length and Orthogonality	#5, 10, 13, 15, 17, 23
	6.2 Orthogonal Sets	#1, 2, 9, 11, 14, 17, 22
13	**Review and Exam II**	
14	6.3 Orthogonal Projections	#3, 4, 11, 12, 13
	6.4 Gram-Schmidt Process	#5, 6, 9, 10
	6.5 Least Squares Problems	
15	Other Topics/Review	
	Final Exam	

Policy Statements:

I adhere to UConn's policies as stated here.

- **Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships —** The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our

community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate Romantic relationships can undermine the University's mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate Romantic relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. (More information is available at http://policy.uconn.edu/?p=2884.)

- **Sexual Assault Reporting Policy —** To protect the campus community, all non-confidential University employees (including faculty) are required to report assaults they witness or are told about to the Office of Diversity & Equity under the Sexual Assault Response Policy. The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. (More information is available at http://sexualviolence.uconn.edu/.)
- **Attendance —** Your instructor expects you to attend class regularly. Besides being nearly essential for developing your understanding of the material, your regular attendance in class is good for the morale of the class and is indicative of your interest in the subject and your engagement in the course. You are responsible for the material discussed in class and in the assigned reading in the text.
- **Student Conduct Code** — Students are expected to conduct themselves in accordance with UConn's Student Conduct Code.
- **Academic Integrity Statement** — This course expects all students to act in accordance with the Guidelines for Academic Integrity at the University of Connecticut. Because questions of intellectual property are important to the field of this course, we will discuss academic honesty as a topic and not just a policy. If you have questions about academic integrity or intellectual property, you should consult with your instructor. Additionally, consult UConn's guidelines for academic integrity.
- **Students with Disabilities —** The Center for Students with Disabilities (CSD) at UConn provides accommodations and services for qualified students with disabilities. If you have a documented disability for which you wish to request academic accommodations and have not contacted the CSD, please do so as soon as possible. The CSD is located in Wilbur Cross, Room 204 and can be reached at (860) 486-2020 or at csd@uconn.edu. Detailed information regarding the accommodations process is also available on their website at www.csd.uconn.edu.
- **Final Exam Policy** — In accordance with UConn policy, students are required to be available for their final exam and/or complete any assessment during the time stated. If you have a conflict with this time you must obtain official permission to schedule a make-up exam with the ~~Office of Student Support and Advocacy~~ (OSSA). If permission is granted, OSSA will notify the instructor. Please note that vacations, previously purchased tickets or reservations, graduations, social events, misreading the assessment schedule, and oversleeping are not viable reasons for rescheduling a final.

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