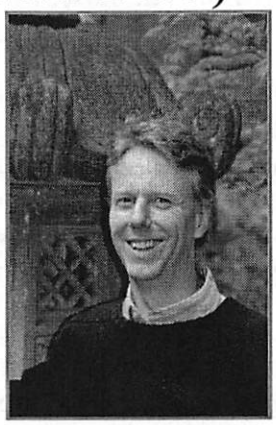
Tom Roby's Math 2210Q Home Page (Fall 2009)
Applied Linear Algebra



Questions or Comments?

- Send me email (click here and delete "QQQ")
- Homepage: http://www.math.uconn.edu/~troby
- Offices: MSB M212 and CUE 123: phone: 860-486-8385
- Office hours: [probably] Tuesday/Thursday 11-11:45 in MSB 212 and by appointment. You can sometimes find me in CUE 123 on MWF afternoons (but safest to call first). I'm happy to answer questions or schedule appointments by email, which I check frequently.

Class Information

COORDINATES: Classes meet Tuesdays and Thursdays 12:30-2:00 in MSB 319. The registrar calls this Section 006, #8244.

PREREQUISITES: Math 1132 (old 116), OR 1152 (old 126), OR 2142 (old 244).

TEXT: David C. Lay: *Linear Algebra and Its Applications, 3rd Ed. Update* Available in the bookstore. Let me know if you have any trouble getting it. The first chapter is available at the weblink above.

WEB RESOURCES: The homepage for this course is http://www.math.uconn.edu/~troby/Math2210F09/. The author also has a useful site with review sheets and downloadable data at: http://www.laylinalgebra.com

GRADING: Your grade will be based on two midterm exams, a final exam, homework, and quizzes.

The breakdown of points is:

Midterms	Final	Quizzes	Homework
20% each	30%	20%	10%

EXAMS: The exam dates are already scheduled, so please mark your calendars now (midterms in class on 6 October and 5 November,, final on 17 December 2009, 10:30-12:30). All exams (like math itself at this level) are cumulative. No makeups will be given; instead if you have an approved reason for missing an exam, the final will count for the appropriately higher percentage.

QUIZZES: Quizzes will be given each Thursday (except midterm exam days), covering (a) sections from the previous week (at the level of HW exercises) and (b) the reading assigned for the current week (at the level of True/False excersies). Your lowest two quiz scores will be dropped.

HOMEWORK: Homework for the sections scheduled for a given week are due the following Tuesday. I will not be able to check your homework carefully, but will be looking for completeness of solutions, not just correct answers.

You may find some homework problems to be challenging, leading you to spend lots of time working on them and sometimes get frustrated. This is natural. I encourage you to work with other people in person or electronically. It's OK to get significant help from any resource, but in the end, please write your own solution in your own words. Copying someone else's work without credit is plagiarism and will be dealt with according to university policy. It also is a poor learning strategy.

CONTENT: Linear Algebra is a beautiful and important subject, rich in applications within mathematics and to many other disciplines. For many of you this is the first course to begin bridging the gap between concrete computations and abstract reasoning. Understanding the notions of vector spaces, linear (in)dependence, dimension, and linear transformations will help you make sense of matrix manipulations at a deeper level, clarifying the underlyng structure.

DISABILITIES: If you have a documented disability and wish to discuss academic accommodations, or if you would need assistance in the event of an emergency, please contact me as soon as possible.

LEARNING: **The only way to learn mathematics is by doing it!** Complete each assignment to the best of your ability, and get help when you are confused. Come to class prepared with questions. Don't hesitate to seek help from other students. Sometimes the point of view of someone who has just figured something out can be the most helpful.

We will often spend classtime doing things in groups, presenting mathematics to one another, or having interactive discussions. There will not be time for "cover" all material in a lecture format so you will need to read and learn some topics on your own from the book (or otherwise).

HONORS CONVERSIONS: If you are in the Honors Program, click on the link for information about converting this course to an honors version.

SCHEDULE: The following is a tentative schedule, that I will update throughout the semester. Generally we will cover three sections per week, which means splitting a section between two lectures. **Lecture notes are linked section by section:** I recommend you print them out or review them before or after lecture, allowing you to focus on the material rather than copying things down.

2210Q LECTURE AND ASSIGNMENT SCHEDULE

Section	Date	Topics	HW Problems
§1.1	9/1 T	Intro to Linear Alg & Systems of Eqns.	1, 2, 3, 10, 12, 13, 15, 16, 21, 24, 25, 31, 32
§1.2	9/3 R	Row Reduction & Echelon Forms	2, 10, 13, 14, 19, 24, 29, 31
§1.3	9/3 R	Vector Equations	3, 6, 7, 9, 12, 14, 17, 21, 22, 23, 25
§1.4	9/8 T	Matrix Equations	1, 4, 7, 9, 11, 13, 17, 19, 22, 23, 25, 31
§1.5	9/10 R	Solution Sets of Linear Systems	2, 6, 11, 16, 17, 19, 22, 23, 28, 30
§1.7	9/15 T	Linear Independence	1, 2, 5, 7, 9, 15, 16, 20, 21, 32, 34

§1.8	9/15 T	Linear Transformations	2, 4, 8, 9, 13, 15, 17, 21, 27, 31
§1.9	9/17 R	Matrix of Linear Transformation	1, 2, 3, 13, 15, 20, 23, 26, 32, 36
§2.1	9/22 T	Matrix Operations and Inverses	2, 5, 7, 10, 15, 18, 22, 27, 28
§2.2	9/24 R	Inverse of a Matrix	3, 6, 7, 11, 12, 13, 18, 23, 24, 29, 32, 37
§2.3	9/29 T	Characterizations of Invertible Matrices	1, 3, 5, 8, 11, 13, 15, 16, 22, 26, 35, 40(challenge!)
§2.4	9/29 T	Partitioned matrices	1, 4, 9, 10, 11, 13, 15, 19
Ch. 1	9/29 T	Supplementary Exercises	6, 7, 10 ,18, 22, 23
§1.1-2.3	10/1 R	Catchup & Review Day	**Do Practice Midterm by today!**

TUESDAY 6 OCTOBER: FIRST MIDTERM EXAM (through §2.3)

§2.5	10/8 R	Matrix Factorizations	2, 5, 7, 21, 23b, 24
§3.1	10/8 R	Intro to Determinants	4, 8, 11, 13, 20, 21, 31, 32, 37, 39
§3.2	10/8 R	Properties of Determinants	2, 3, 8, 10, 16, 17, 20, 26, 27, 32, 34, 40
§3.3	10/13 T	Cramer's Rule & Volumes	4, 5, 6, 13, 16, 22, 23, 26, 29, 30
§4.1	10/13 T	Vector Space & Subspaces	1, 3, 8, 12, 13, 15, 17, 22, 23, 31, 32
§4.2	10/15 R	Null Spaces, Column Spaces & Lin. Transf.	3, 6, 11, 14, 17, 19, 21, 24, 25, 32, 33, 34, 36
§4.3	10/20 T	Bases and Lin Ind. Sets	3, 4, 8, 10, 14, 15, 21, 23, 24, 29, 30, 31
§4.4	10/22 R	Coordinate Systems	2, 3, 5, 7, 10, 11, 13, 15, 17, 21, 23, 32
§4.5	10/27 T	Dimension of a VS	1, 4, 8, 11, 14, 21, 23, 26, 28, 29
§4.6	10/27 T	Rank	2, 5, 7, 10, 13, 19, 24, 27, 28
§4.7	10/29 R	Change of Basis	1, 3, 5, 7, 9, 11, 13, 15
§1.1-4.7	11/3 T	Catchup & Review Day	Do Practice Midterm 2 by today

THURSDAY 5 NOVEMBER SECOND MIDTERM EXAM (through §4.7)

§5.1	11/10 T	Eigenvectors & Eigenvalues	2, 6, 7, 11, 13, 15, 19, 21, 23, 24, 25, 27, 31
§5.2	11/10 T	Characteristic Equation	2, 5, 9, 12, 15, 19, 20, 21
§5.3	11/12 R	Diagonalization	1, 4, 5, 9, 11, 15, 17, 21, 24, 26
§5.4	11/17 T	Eigenvectors & Linear Transformations	1, 3, 6, 7, 10 ,15, 16, 23, 25
§6.1	11/17 T	Inner Product & Orthogonality	3, 5, 10, 16, 18, 19, 23, 25, 27, 29
§6.2	11/19 R	Orthogonal Sets	3, 6, 8, 9, 11, 14, 20, 21, 23, 26, 27, 28, 29
§6.3	11/19 R	Orthogonal Projections	1, 6, 7, 9, 11, 13, 17, 21, 23, 24

23-27 NOVEMBER THANKSGIVING BREAK NO CLASSES

§6.4	12/1 T	Gram-Schmidt Process	1, 3, 7, 9, 11, 17, 19
§6.5	12/1 T	Least-Squares Problems	3, 5, 7, 9, 11, 17, 19, 21
§7.1	12/1 T	Diagonalization of Symmetric Matrices	1, 3, 5, 8, 10, 13, 17, 19, 25, 29
§7.2	12/3 R	Quadratic Forms	1, 5, 8, 11, 13, 19, 21, 27
§7.3	12/8 T	Constrained Optimization	1, 3, 5, 7, 11
§7.4	12/8 T	Singular Value Decomposition	1, 3, 9, 11, 17
§1.1-7.4	12/10 R	Catchup & Review Day	Do Practice Final by today

***THURSDAY* 17 DECEMBER 10:30-12:30 FINAL EXAM IN MSB 319**

Interesting Links

- The MIT 18.06 (Linear Algebra) website has lots of resources, including Mathlets (small web-based learning tools) for your learning pleasure.
- This website (found via Google) has a brief one-page blurb on computing Google's pagerank algorithm.
- A Gaussian Elimination (row reduction) applet from Terry Tao's website
- A linear transformation applet for the plane from Smith College
- Here's another Online Row Reducer from Greg Landwebber's Cohomology.com website.

NEWS & NOTES

Here is Practice Midterm 1!

The quiz on Thursday 10/8 will cover §2.4, §2.5, and §3.1 at the level of True/False & easy computation.

Since there was some confusion over when HW is due, please hand in the HW for §2.3-5, the Ch. 1 Supplementary Exercises, and §3.1 on Tuesday 10/13.

HW for §3.1-3 and §4.1 are due on Tuesday 10/20.

Midterm rewrite opportunity: For up to 12 extra points on the exam, you may hand in the following on TUESDAY 27 October: A carefully rewritten version of #8 on the exam (NOW CHANGED TO: Show if {v_1,v_2,v_3} is linearly independent, then so is {v_1,v_1-v_2,v_1-v_2-v_3}), along with carefully written answers to §1.7, #36 and #38.

HW for §4.2-3 are due on Tuesday 10/27.

Here is Practice Midterm 2!

Quiz on Thursday 29 Oct covers §4.3-5.

HW for §4.4-7 are due on **Thursday** 11/5 (postponed from Tuesday).

No office Hour on 11/17. (I need to attend a student's oral exam.)

Final Exam will be ***THURSDAY*** of finals week. (I had the date correct, but wrong day of the week on the schedule until 16 Nov.)

Midterm 2 rewrite opportunity: For up to 12 extra points on the exam, you may hand in the following on THURSDAY 3 DECEMBER:

- §2.5, #3 & 18;
- §4.6, #20
- Problem #9, REPLACING the transformation T with the following: S:P_3_ -->P_4_ by $T(p)= \int p(x)\,dx$

Here is a Practice Final.

Student Evaluations of Teaching will be handed out near the end of class on Tuesday 8 December (or at the latest Thursday 10 December).

Review Session: Wednesday 16 December 2009 5-6:30ish in MSB 211. Bring your questions!

You may hand in HW for sections §7.3-4 for extra credit to me at the start of the final exam, and pick them up at the end.

For the final, you may bring a 4" x 6" index card (two-sided) with any notes or formulae you wish. No other notes, books, or resources beyond your own personal brain are to be used.

Back to my home page.
