Matrix Algebra and Its Applications

MA322-007
Spring 2015
TuTh 9:30am in CB335

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Learning objectives: After this course you should be familiar with core concepts of linear algebra: linear system of equations, matrix representations of systems and linear transformations, vector spaces, eigenvalues, orthogonality, and quadratic forms. We will cover least squares, SVD, and PCA which are useful both conceptually and practically.

I hope that you will become comfortable applying these techniques in the wide range of linear and bilinear problems you will encounter. If it has numbers, and you add or multiply them, then the odds are pretty good it is a linear or bilinear problem.

We will also be skipping many important aspect of linear algebra due to time constraints. Feel free to email me about these and I can give short private lessons at the right time during the course (I suggest checking if any of these words are important to people on your path: "LU," "pivoting," "shear transformation," "change of basis," "Markov model," "iterative methods," "Gram Schmidt," "inner products").

Textbook: David C. Lay's *Linear Algebra and its applications*, 4th edition, ISBN 0-321-38517-9. I believe it will be difficult to do well in the class without reading the book regularly. My lectures and exams will assume you've done your assigned reading.

Absences: Let me know in advance (or within 12 hours of the start of the exam) if you cannot take the exam; otherwise the exam grade is a 0. Makeup exams may be significantly delayed. Other absences need to be reported within one week of the first day of absence, and in "writing" by which I mean email to ⟨jack.schmidt@uky.edu⟩ or a text to 512-522-5137. Make sure to include your first and last name in the text, and MA322 in the email subject. Excused absences will be handling according to the university senate rules (5.2.4).

Grading: Your grade will be determined based on your performance on exams, quizzes, and a written project. Each exam is weighted equally to the project. The entirety of the quizzes is weighted equally to one exam. Homework is assigned, and may be used during the quiz. The final exam (8am Thursday May 7) is just another chapter exam. Makeup exams may be given 9am Thursday May 7.

Cheating and plagiarism will be handled according to university senate rules (6.3). An assignment involved in cheating or plagiarism will receive a 0. Other factors (outlined in the USR) may result in more severe consequences such as an E in the course or expulsion.

Quizzes are open note and your final quiz grade is based more on effort than success-in-the-moment. Exams will gauge whether you eventually understood it.

Expectations: Before each class: read the section scheduled for that day. It is fine not to understand part (or even most) of it. Linear algebra isn't something you learn so much as something you just get used to. Feel free to try a few of the exercises to gauge your current tolerance level. In your notes, write down the bold words, and a short summary of any theorems or definitions. Leave space near them.

During each class: Try to write down the parts that make sense now. Your notes should already have space next to the bold words and theorems. Now you get to fill it with knowledge or question marks.

After each class: read the section again, and try the assigned homework exercises. Try to explain the solution to at least one homework exercise to your study group. You might be able to change a few question marks to something more confidence inspiring.

Before each review day: collect your questions from the notes, and then sort them. Which questions are holding you back? Leave space for answers.

During review day: Fill in the blanks with newfound understanding ... or more question marks.

After the review day: study group time. Fix those question marks.

Exams: These are in class exams. They are never intended as a surprise. They are intended to be pretty challenging. They should cover both calculations and conceptual understanding. Exams will take about 45 minutes and will be done at the end of class. At the beginning of class, I will answer any questions, cover a little bit of material, and then leave about 5 minutes for you to gather your thoughts before the exam.

Speed of grading: I will try to get your quizzes back to you the next class day. I will try to get your exams back the next day. However, I will be teaching about 500 students this semester, and so please be understanding of any delays.

Tentative Schedule: Please note this schedule is subject to change. You are responsible for all in-class announcements, including exam date changes.

	Jan 15 1.1 / 1.2
Jan 20 1.2/1.3	Jan 22 1.3/1.4
Jan 27 1.5/Rev	Jan 29 Exam
Feb 3 1.7/1.8	Feb 5 1.8/1.9

Feb 10 2.1/2.2	Feb 12 2.2/2.3
Feb 17 3.2/Rev	Feb 19 Exam
Feb 24 4.1/4.2	Feb 26 4.2/4.3
Mar 3 4.4/4.5	Mar 5 4.5/4.6

Mar 10 Rev/Proj	Mar 12 Exam
Spring Break	
Mar 24 5.1/5.2	Mar 26 5.2/5.6
Mar 31 5.6/Rev	Apr 2 Exam

Apr 7 6.1/6.2	Apr 9 6.3/6.5
Apr 14 6.5/Rev	Apr 16 Exam
Apr 21 7.1/7.2	Apr 23 7.2/7.3
Apr 28 7.4/7.5	Apr 30 7.5/Rev
	May 7 Final

Before next class (Tue Jan 20) (a) reread 1.1-1.2 and fix your notes, (b) read 1.3 and prepare your notes, and (c) do HW1.1 #5, 9, 17+18 (explain how), 23, 29, 31, 33, 34; and do HW1.2 #1, 3, 5, 7, 9, 13, 15, 21, 23, 25, 27.