

Math 413/513

Linear Algebra

MWF 12:00-12:50 PM, C E Chavez 105

Fall 2015

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Course homepage: <http://math.arizona.edu/~glickenstein/math413>.

Office hours: Tuesday 2-3 (in Math 204), Thursday 1-2 in Math 220 (tutoring room), Friday 10-11 (in Math 204)

TA-run practice session: Thursdays 6-7 in Math 402.

Prerequisites: Math 215 or Math 313: Introduction to Linear Algebra, and Math 323: Formal Mathematical Reasoning and Writing. This course presupposes the students are well acquainted with working with vectors and matrices of real numbers as in a first course in linear algebra, and also that the students have had a course with significant proof writing. This course is meant to be a proof-based, senior level math course, and as such all homework and exam questions will require sufficient justification in the form of a proof, counterexample, or argument as appropriate to the mathematical culture of such courses unless otherwise noted.

Textbook: *Linear Algebra*, Fourth Edition, by Friedberg, Insel, and Spence, published by Prentice Hall.

Supplemental references: *Linear Algebra Done Right*, by Axler. We may also use additional materials which will be available on the course website.

Homework: Homework will be assigned on a regular basis. Only part of the homework will be turned in, but all should be done. **Since only a small number of problems will be turned in, it is expected that the homework assignments will be immaculate, typed or neatly handwritten, with explanations written in complete sentences when appropriate.** Sloppy work will not be accepted. In addition, exams will consist approximately 30-50% of problems taken directly out of the homework, mostly from problems not turned in for grading. Homework will be worth 100 points, or the equivalent of one exam. Homework will usually be due in class, with a no penalty extension until 4pm on the same day (to be turned in to the homework box in Math - be sure to have instructor's name on it - or directly to the instructor).

Quizzes: In addition to regular homework, there will usually be a short quiz each Monday at the beginning of class. There will be no makeups for quizzes, but at least 2 quiz grades will be dropped before figuring out the quiz grade. The scores for the quizzes will be averaged and then rescaled to make up 25 points.

Chapter checks: In addition to regular homework and quizzes, at the end of each chapter will be a short homework that checks your understanding of the material from that chapter. This homework will be able to be turned in twice and will have a more flexible due date. The scores for the chapter checks will be averaged and then rescaled to make up 50 points. The questions on the chapter checks will not be indicative of the kind of questions asked on exams, which will require deeper knowledge than the chapter checks.

Exams: There will be two in-class exams and a final. Approximately 30-50% of each midterm will consist of problems taken directly from the homework (including homework assigned but not turned in), and the rest will consist of new problems. Each of the three exams will be worth 100 points. **The midterm exams are tentatively scheduled for Wednesday, October 14 (revised!) and Wednesday, November 18 and the final exam will be take home, assigned on the last day of class and due during the scheduled Final Exam Time of Thursday, December 17 at 10:30am.**

Comprehensive/Graduate Option: Additional homework will be assigned labeled "Comprehensive/Graduate Option." These are optional for students registered for 413, but can be extra credit for those students who wish a more in-depth treatment of the material in this course. These are mandatory for students registered for 513. There may also be some testing options covering these materials (such as a question on the final covering this material). The total amount of extra credit will be determined later in the course, but will not exceed 10% of the tentative grade (see below).

Grades: A tentative grade will be determined by assigning 25 points to quizzes, 50 points to chapter checks, 100 points to the homework, 100 points to each of the exams, and adding in any extra credit, then using the standard scale of 90-100% A, 80-89% B, 70-79% C, etc. The final course grade will be at least as high as the tentative grade. Small adjustments may be made on consideration of positive trends in the class.

Attendance: Students are expected to attend every scheduled class and to be familiar with the University Class Attendance policy as it appears in the General Catalog. **Any student who does not attend the first two classes and does not contact the instructor may be automatically dropped from the course** (but if you want to drop the course, be sure YOU be sure to drop it). Students are expected to behave in accordance with the Student Code of Conduct and the Code of Academic Integrity. The guiding principle of academic integrity is that a student's submitted work must be the student's own. **It is the student's responsibility to keep informed of any announcements, syllabus adjustments or policy changes made during scheduled classes.** . University policies can be found at <http://deanofstudents.arizona.edu/policiesandcodes>. Note that we may do valuable in-class activities and it is recommended that students attend all scheduled classes.

Recitation: There will be an optional recitation to be scheduled during the first week of class.

Students with disabilities: If you anticipate issues related to the format or requirements of this course, please meet with me to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (621-3268; <http://drc.arizona.edu>). You should notify me of your eligibility for reasonable accommodations by Monday, September 7. At that point, we can plan how best to coordinate your accommodations.

Withdrawal: You may withdraw from the course with a deletion from your enrollment record through September 6 using UAccess. You may withdraw with a grade of "W" through November 1 using UAccess. The University allows withdrawal until November 20, but only with the Dean's permission. Late withdrawals are dealt with on a case by case basis, and requests for late withdrawal without a valid reason may or may not be honored.

Incompletes: The grade of I will be awarded if the student has completed all but a small portion of the required work, has scored at least 50% on the work completed, has a valid reason for not completing the course on time, agrees to make up the material in a short period of time, and asks for the incomplete before grades are due, 48 hours after the scheduled final exam.

Tutoring services: Upper division tutoring is offered at the Math Center in Mathematics 220. Check <http://math.arizona.edu/academics/tutoring/math323> for the schedule.

Tentative approximate schedule

We give a rough possible schedule, but may need to deviate from this as the instructor sees fit. Be sure to be aware of announcements made in class and on the course website.

Week	Chapter	Topic	Comprehensive/Graduate Extra Topic
1-2	1	Vector spaces, subspaces, linear independence, span, basis, dimension	Quotients
3-4	2	Linear transformations and matrices	2.6 Dual spaces
5-6	3	Linear equations and inverses	
7	4.1-4.3	Determinants	4.5 Characterization of determinant
8-9	5.1-5.2	Diagonalization	5.3 Markov chains
10-12	6.1-6.6	Inner product spaces	6.7 Singular Value Decomposition
13-15	5.4, 7.1-7.3	Canonical forms and the minimal polynomial	