

Linear Algebra I (Math 369–001)

Fall 2014

Technicalities

Instructor: Dr. Clayton Shonkwiler (clayton@math.colostate.edu)

Office: Weber 216

Course web page: <http://www.math.colostate.edu/~clayton/teaching/m369-001f14/>

Text: *A First Course in Linear Algebra*, by Robert A. Beezer, which is available free online at <http://linear.ups.edu/html/fcla.html>

Time/Location: 9:00–9:50 MWF, Engineering E205.

Office Hours: Monday 11:00–12:00, Wednesday 11:00–12:00 and 2:00–3:00, Thursday 4:00–5:00, and by appointment.

Summary of the Course

Linear algebra is one of the most important and fundamental subjects in mathematics: virtually every area of mathematics relies on or extends the tools of linear algebra. Moreover, linear algebra provides the theoretical underpinnings for countless applications in scientific computation, engineering, and statistical models in the social sciences.

This course provides an introduction to the ideas and methods of linear algebra, which you will learn by understanding them geometrically, justifying them algebraically, and using them to solve problems in various disciplines. In addition, the course serves as an introduction to abstract reasoning and mathematical proof. It is a prerequisite for all advanced courses in mathematics and provides excellent preparation for graduate work in the natural sciences and quantitative social sciences.

Homework

Homework will be collected approximately weekly. Each assignment will consist of a reading assignment and a number of problems to be done. Assignments will be posted to the course webpage as well as to RamCT.

Homework is an important part of any math class, as it is impossible to *learn* mathematics without actually *doing* mathematics. The goal of the assignments is to deepen your understanding of the concepts, tools and techniques discussed in class, as well as to give you the opportunity to practice explaining your mathematical thinking. The importance of effective communication is vital: knowledge without the ability to communicate that knowledge is of limited value. As such, to get full credit on a problem your solution must be clear and well-written.

Homework must be stapled with your name clearly written at the top. What you turn in should be a final copy: it should be neat, legible, and well-organized. If I can't read or understand your work you won't receive any credit.

Late homework will not be accepted, so you should turn in whatever you have completed on the due date in order to get credit for it. Your lowest homework grade will be dropped from the calculation of your final grade.

I strongly encourage you to work on solving homework problems with your fellow classmates. However, the work you turn in must reflect your own knowledge and understanding and not that

of anyone else. Therefore, you *must* write up your solutions by yourself.

Exams

There will be two midterm exams and a final. The midterms will be 50 minute in-class exams and are tentatively scheduled for **October 3** and **November 14**. The final exam will occur in Engineering E205 (our regular classroom) from **9:40–11:40 AM on Monday, December 15**.

No make-up examinations will be given in the course. If you are absent from a scheduled exam and your absence is excused (with supporting documentation from, e.g., a medical or legal professional), the portion of the course grade determined by the missing exam will be divided equally between the other exams (including the final). Please let me know as soon as possible if you have a conflict with one of the test dates.

Grading

Your final grade in the course will be determined by:

Homework and Class Participation: 30% (lowest homework score dropped)

Exams: 20% each

Final Exam (comprehensive): 30%

Here's how the grading process works. First, I compute an overall course grade for you on a scale of 0–100 by combining your exam and homework grades using the weights above. For example, if you have scores of 75% and 80% on the two midterms, 85% on the final, and 90% on the homework and class participation, I would compute this score as

$$\underbrace{0.75 \times 20 + 0.80 \times 20}_{\text{midterm exams}} + \underbrace{0.85 \times 30}_{\text{final}} + \underbrace{0.90 \times 30}_{\text{homework}} = 83.5.$$

After computing this score, I rank everybody in the class in order by their score and assign cutoffs for 'A', 'B', 'C', and 'D'. Generally these are somewhat lower than the traditional 90, 80, 70, and 60. When setting the cutoff I consider the students immediately above and below the line and try to take into account improvement and other circumstances. That being said, the list is never, ever reordered. Regardless of other circumstances, a better score in the class should always earn at least as good a letter grade. Ultimately, I can only grade the course based on what's in your written work.

Scores will be maintained on RamCT (<https://ramct.colostate.edu/>); please check occasionally to make sure your scores have been entered correctly.

Attendance

You are expected to attend class every day, to participate in class, to read the textbook, and to do the homework.

Academic Honesty

As a Colorado State University student, you have agreed to abide by the University Policy on Academic Integrity (General Catalog – 1.6, pages 7–9) and by the Student Conduct Code

(<http://www.conflictresolution.colostate.edu/conduct-code>). All academic work must meet the standards described in the Academic Integrity Policy. At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

Lack of knowledge of the academic honesty policy is *not* a viable explanation for a violation. Questions related to coursework and the academic honesty policy should be discussed with the instructor.

You are encouraged to *discuss* homework problems with your classmates, but the work you turn in must be your own, and in particular you should write up your final solutions independently.

Additional help

If I were a perfect teacher, you could learn everything you need to know just by going to class and doing the assignments. Unfortunately, I am not a perfect teacher, so there's a good chance that, at some point, you'll find yourself confused, stuck or otherwise frustrated by the material or the course. If you do, ask for help! Office hours are, of course, an excellent venue for this, but if you feel uncomfortable asking my help or if you find that my teaching style and your learning style simply don't mesh, there are many other resources available to you.

First and foremost, your fellow classmates are a great resource. Odds are that, for any question you have, there's someone in the class who can answer it, so don't be afraid to ask. Even the simple process of explaining why you're stuck to someone who is just as confused as you is often enough to make things clearer. Just be sure to return the favor when you get the chance to help someone else.

Second, TILT provides math and science tutoring every Sunday–Thursday from 5:00–10:00 PM. See <http://tutoring.colostate.edu/content/arts-and-sciences-tutoring-program> for details. The Tutoring@CSU site at <http://tutoring.colostate.edu> is an excellent resource; for example, it also maintains a list of private tutors.

Third, the math department maintains its own list of recommended private tutors (typically graduate students and advanced undergraduates):
<http://www.math.colostate.edu/tutorlistsm14.html>.

If none of the above is suitable or practical, please let me know and I'll be happy to help you find additional resources.

Accommodations

If you think you may need accommodations in this course due to the impact of a disability please meet with me privately during the first week of class. You should also contact the Resources for Disabled Students office (<http://rds.colostate.edu>) to confirm your eligibility for appropriate accommodations. Doing so early in the semester will help prevent unnecessary inconvenience.

Copyright

All of the course materials, including tests and exams, are copyright by the instructor, even if the © symbol does not appear on them. You may not upload or post copies of these materials to the web without my explicit written permission.

Disclaimer

The course syllabus is a general plan for the course; deviations announced in class may be necessary.

1 Anticipated Schedule

Week	Subjects (Sections from the text)
08.25–08.29	Systems of Linear Equations (WILA, SSLE, RREF)
09.01–09.05	Matrices and Equations (VO, MO, MM, HSE)
09.08–09.12	Matrix Operations and Inverses (MISLE, LC, SS)
09.15–09.19	Abstract Vector Spaces (VS, S)
09.22–09.26	Span and Independence (LI, LDS, LISS)
09.29–10.03	Bases (B) MIDTERM #1
10.06–10.10	Linear Maps (LT, ILT, SLT)
10.13–10.17	Representations and change of basis (VR, MR, CB)
10.20–10.24	Eigenvalues and Eigenvectors (EE, PEE)
10.27–10.31	Bases and Determinants (DM, SD)
11.03–11.07	Canonical Forms
11.10–11.14	Examples MIDTERM #2
11.17–11.21	Inner Products (O)
11.24–11.28	THANKSGIVING BREAK
12.01–12.05	Orthogonalization and Projection
12.08–12.12	Applications and Conclusion
12.15	FINAL EXAM at 9:40 AM