MATHEMATICS 3130
FALL 2013
LINEAR ALGEBRA

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Monday, Wednesday, Friday 1:00-1:50 pm, FLMG 103.

http://math.colorado.edu/∼kstange/3130-Fall2013
It is your responsibility to notice online announcements, which will be posted under "Virtual Office Hours".

This is NOT a standard Lecture-Exam-Homework Course!

Goals and Prerequisites

This course has several complementary goals for the students:

First, to be adept at the application of *linear algebra* to problems. You are physics, math, economics, and science majors, and others who will need to apply linear algebra in your future careers, so we will put an emphasis on applications.

Second, to learn the mathematical structure of the subject of linear algebra, including *why the recipes work*. How is that useful? Because then you can adapt the recipes to your own problems in the future: you will know how to make up a correct method for solving a novel problem.

And **Third**, to learn the skills of *mathematical thinking*. This is rarely taught. Unfortunately, it is not necessarily the natural side-effect of taking college mathematics that it is assumed to be. Instead, students can benefit from being *taught* the mathematical thinking skills that will get them through all their other math courses.

Fortunately, these three goals can be accomplished simultaneously by using the *material* of linear algebra (the first two goals) as a case study for the development of *mathematical thinking* (the third goal). Instead of learning the material and hoping the mathematical thinking will follow,

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we will emphasize the skills involved in learning mathematics by practicing on the material. *These skills will benefit you enormously in your future mathematics classes.*

Of course, this requires that the course have a different structure than a usual mathematics course. What we will be doing is a version of *flipping the classroom*. Flipping, or *inverting* the classroom is a term for taking the passive lecturing out of the classroom and using classroom time for active work. You will be expected, nay, **absolutely required**, to read the textbook and do a few problems according to a regular schedule. First, you will read the material on your own, and do problems. Second, you will be tested on the reading. Third, we will discuss the reading: clearing up confusions, discussing the main points, working examples, and discussing relevant mathematical thinking skills. Fourth, you will write up correct solutions and hand in the problems.

The first week will focus on *how to read mathematics*.

Course Schedule

Please see the online schedule of readings, which may be modified to suit the needs of the class.

In addition, there are three important dates:

First Midterm	Tuesday, October 1st, 5:15 - 6:45 pm
Second Midterm	Tuesday, November 5th, 5:15 - 6:45 pm
Final Exam	TBA

Resources

Textbook. Linear Algebra, 4th Edition, David C. Lay.

There will be a few readings from a different textbook available free in PDF format online (*Linear Algebra*, Jim Hefferon); this can be found under 'Resources' on the course webpage.

You may find the *Study Guide* which accompanies Lay's textbook to be useful; a copy will be on reserve at the library (as will Lay's text itself).

Clickers. You must purchase a clicker if you do not already have one.

Calculator. Not required. Not used for exams. However, you will need to have some automated linear system or matrix equation solver for homework. Such programs can be found online and you can find links on the course webpage (see 'Resources').

Interacting with the Course

Virtual Office Hours: You may email math and course questions to

`kstange@math.colorado.edu`.

Questions of interest to your classmates will be anonymized and answered by the instructor on the website, for the benefit of all students, unless you request otherwise.

Instructor's Office Hours:

- **Regular Office Hours:** TBA, 2 hrs per week.
- **Irregular Office Hours:** For students who cannot make the regular office hours, I will announce an extra office hour fitting the schedule of those that ask; this hour may change each week and will be posted online.
- **Your Very Own Office Hours:** You can always make a private appointment. This is only for private matters.

Discussion Boards. The course does not have an discussion board per se, but you can use the comments section on the page "Discussion" on the Virtual Office Hours blog to post comments on any relevant topic. If there is demand for something more formal, we can set something up.

Study Groups. Please take a moment now, while reading this syllabus, to get the names and contact info of the people nearest you in the class. It will be to your advantage to locate those in your dorm and hold study sessions.

Name	Contact Info
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.....	.....
.....	.....
.....	.....

Grading

The grading breakdown will be as follows:

Final Exam	30
Best Midterm	20
Worst Midterm	14
Written Homework (best 36 of 43 assignments)	18
In-class Quizzes (best 36 of 43 quizzes)	18

Final Exam

The final exam will be cumulative. It will be designed to take two hours to complete, but you will be given 2.5 hours to write it.

The Two Midterms

They will each be designed to take one hour to complete, but you will be given one hour and a half to write them. They will each be cumulative with a strong emphasis on the material since the last midterm. Your worst midterm will count for less.

Written Homework Assignments

Solutions will be available online.

Important: the homework will *not* cover every 'type' of problem that may appear on the final exam. In fact, this course doesn't consist of a finite number of 'types' of problems. Instead, you are expected to actually do as many problems from the text as you need to in order to attain conceptual understanding. The odd numbered problems have solutions in the *Study Guide*. If you are finding these problems doable without help, then you have sufficient preparation for exams. If they are not doable without help, then you must practice more. We will discuss ways to get more practice, but the fundamental way is to do more problems. The textbook comes with ample problems and solutions.

In-Class Quizzes

At the beginning of *every* class, based on the assigned reading/problems for that class. Administered with clickers.

Sources of Help

The course website has links to resources, including internet resources and information about the Undergraduate Mathematics Resource Center (aka "Help Lab"), which is open Monday–Thursday, 9 am - 5 pm, and Friday, 9 am – 2 pm.

IMPORTANT: Carefully read the Policy on Homework Help below before you ask a tutor for help. A tutor should not simply provide an answer to your homework; they should help you by socratic method or demonstrate a similar problem. Not all tutors know this, so please educate them.

It's possible you suffer from math anxiety. Although fear of math is like fear of chocolate, even mathematicians can suffer from it! Please come talk to me.

Course Policy on Homework Help

On graded work, you are encouraged to seek help through all the means available to you: instructors, resource center, internet, tutors, etc. The internet *can* do your homework for you, especially the computational parts. However, it is your responsibility to seek only those means of help through which you *learn*. For example, it is generally not helpful to your learning to have your tutor demonstrate the solution to your homework problem from start to finish. It may be helpful for a tutor to lead by socratic method or to give you a hint about the next step. Specifically, when you write your solutions, **you must write them alone, in your own words, using your textbook and course notes if necessary, not copying from other notes, websites, friends, or any other source**. This means you can work on problems with your friends, your tutor, or your dog, but you

must **not** copy answers during the discussion; instead, you must write in your own words, afresh from your own newly improved brain, *after* the discussing and working has been done. This is course policy, but it is also common sense study habits. Failure to follow this policy may result in a grade of zero.

Special Requests

I am happy to accommodate disabilities or religious observances, or a request that I address you with a different name or pronoun than my roster indicates. Please contact me as soon as possible.

Missed or late work:

... receives a zero. For homework and quizzes, the seven lowest scores are automatically dropped; this should cover any unexpected illnesses or other legitimate reasons to miss work. A missed midterm will count as zero.

If you have a religious exception or other legitimate reason to reschedule a midterm, please make arrangements with me **as soon as possible.**

If you missed a midterm without permission, you must supply a note specifically excusing your absence (i.e. 'Jane Doe *could not* attend the midterm because she swallowed a cat / was abducted by militant Pastafarians') from a doctor or the Office of the Dean of Students. In that case, and only in that case, appropriate grading adjustments will be made.

University Policies

Please see the course website for University Policies concerning such matters as religious holidays, the Honour Code, harassment, etc.