M235H.1–Honors Introduction to Linear Algebra
Spring 2017 Syllabus

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The textbook is required.

Office hours: To be announced. In addition to my scheduled office hours, you
can always make an appointment in class or by email. And you
can stop by my office at any time; if I’m there and not busy,
I’ll be happy to talk to you then and if I am too busy to talk,
we can set up another time.

Course description: Linear algebra starts with the study of solutions of
systems of linear equations, say \( m \) equations in \( n \) variables, of the kind you’ve
seen even in high school algebra. In this course, we’ll develop ways to solve
such systems, and then more sophisticated ways of thinking about them that
let us derive properties of the solutions without explicitly solving the systems,
find ways to convert a given system into a more convenient one, and understand
how a vast range of different kinds of mathematical problems can be cast into
this framework. Linear algebra is the foundation of very large parts of pure
and applied mathematics, statistics, mathematical physics, machine learning,
etc., and this course will develop the basic machinery that will let you use and
explore those fields.

This is the honors version of the course. What’s the difference between the
honors version and the non-honors one? Well, there are some obvious differences,
such as there only being 25 students in the class instead of 60 or 70. But the most
important part is that the non-honors course takes a basically computational
viewpoint, in the sense that it teaches students to make use of some of the
machinery of linear algebra to do computations. We’ll do that in this course, too,
but we’ll also try to develop a deeper understanding of where that machinery
comes from, how different views and methods are connected, and how the ideas
can be extended in various directions (e.g., to consider vectors that aren’t just
points in Euclidean space). Linear algebra is a big subject and this is just an
introduction, but our goal is to have you think about the material in the course
in pretty much the way that experts do.

The textbook we’re using is the one used at MIT. In fact, MIT makes videos
of the course, taught by the author of the textbook, available as part of its Open
Courseware program, and you’re welcome to use those videos as a supplement
to our class. But the reason I’ve chosen this book over the one we use for the
non-honors version of the course is that it brings out exactly the things that I
want us to do that separate the honors version from the non-honors one. It’s also much more fun to read; Strang has a very definite “voice” and viewpoint. (Note that Strang also has a somewhat more advanced book called Linear Algebra and Its Applications. We’re currently using that for Math 545; you don’t want that one for this course.) I hope to get through at least most of the first eight chapters, and perhaps get to talk a bit about the applications in later chapters.

There will be (more or less) daily reading assignments in the text and (more or less) weekly homework sets. I will not be presenting everything you need to know in class. Instead, you will be expected to learn from the lectures and discussion in class, the textbook, and doing homework problems (as well as discussions outside class with your fellow students, etc.). In class, I will try to go over the main ideas from each section, sometimes presenting them in a different way than the book does, and to answer questions and clarify things that people had difficulty with. You will definitely need to be active and thoughtful in both class and your reading.

Course structure and policies  Attendance is required; participation in class discussions is expected and will count as part of the grade. This also means that you should be in class on time. (If logistical problems mean you will often be late, please discuss this with me.) There will be frequent reading assignments as well as homework to submit; you need to have done the reading before the class at which it will be discussed and I expect that you will submit homework on time. Homework to be collected in class will be due at the start of class. Assignments (both reading and written assignments) will be posted on the course web page, as will various announcements.

There will be two exams during the semester, each counting 20% of the grade, and a final exam counting 30% of the course grade. (The final exam will be on Monday, May 8. Don’t plan to leave for the summer until after the exam!) Homework, quizzes, and participation combined will be 30% of the grade. If you will be unable to complete an assignment on time or will miss a quiz or exam, it’s your responsibility to notify me as soon as possible (before the due date or exam, if at all possible). Note that sending me an email does not automatically excuse late work, a missed exam, etc. And, since email is not a completely reliable medium, if you send me an email and don’t get an acknowledgment in a day or so, you should try reaching me by some other method.

Except when explicitly working in groups, your work should be your own and any use of outside sources must be explicitly acknowledged. You must observe the UMass Academic Honesty policy, http://www.umass.edu/honesty.