

Math 70 will be run online in fall 2020 because there aren't enough large classrooms to socially distance our classes during the pandemic.

Section 04: Online by Zoom

Tuesday, Thursday, 3:00-4:15 p.m. Instructor: Todd Quinto (Todd.Quinto@tufts.edu)

Office Hours: TBD, will be posted on the Canvas course calendar for our class (see below).

Teaching Assistant: Nathan (Nate) Fisher, nathan.fisher@tufts.edu

He will run a weekly problem session at a time TBD. It will be posted on the Canvas course calendar for our class.

Synchronous Meetings (live over Zoom): 3:00-4:15 Tuesdays and Thursday, Eastern Time.

Zoom link to class meetings: will be posted on the Canvas course calendar.

When we Zoom, I highly encourage you to turn on your video so we can interact and I can tell how you're understanding—this will help me gauge the class. To help this along, at the start of the term I will e-mail a Tufts background you can use if you like (Zoom has some cool backgrounds, too). I do understand some participants will not want to use their video, so this is not a requirement.

Considerations for Students in Different Time Zones and Students Who Become Quarantined: I will record every class session and post it on canvas. I will survey all my students to find good times for office hours, and I will always be happy to meet at other times.

Course Description: Linear algebra is the study of matrices, vector spaces, and linear transformations. In Math 70 we start by studying systems of linear equations. This will quickly lead to useful concepts such as vector spaces, dimension (you will learn about four-, five-, and infinite-dimensional spaces), linear transformations, and eigenvalues. These concepts will help you solve linear equations efficiently, and more importantly, they fit together in a beautiful framework that will give you a deeper understanding of mathematics. Linear algebra arises everywhere in mathematics (you will use it in almost every upper level math course) as well as in physics, chemistry, biology, engineering, economics, and a range of other fields. Even when a problem involves nonlinear equations, as is often the case in applications, linear systems still play a central role, since the most common methods for studying nonlinear systems approximate them by linear systems.

Among the applications of linear algebra are solutions of linear systems of equations, determining conic curves and quadric surfaces not in standard form, the second-derivative test in vector calculus, computer graphics, linear economic models, and differential equations. Linear algebra also enters in further study of calculus, where the derivative is viewed as a linear transformation.

In addition to computation and problem-solving, axiomatic mathematics and basic proofs are important parts of the course.

Prerequisites: Math 34 (or 39) (second semester calculus) or instructor's consent.

Required text: MyLab Math for *Linear Algebra and its Applications, 6/e* by Lay. MyLab Math is a website that includes the computational homework problems we will assign as well as a PDF copy of the book, *Linear Algebra and its Applications, 6/e* by Lay.. It also includes sample tests and quizzes. You have two options, the first without a hardcopy of the book and the second with a hardcopy:

- (1) *MyLab Math Student Access Card for Linear Algebra and its Applications, 6/e* by Lay. This includes access to MyLab Math for the assigned homework problems as well as sample tests and quizzes. It includes a PDF copy of the book. You have access for 18 weeks (more than the term). (ISBN: 9780135851159)
- (2) *MyLab Math Student Combo Access Card for Linear Algebra and its Applications, 6/e* by Lay. This includes the access to MyLab Math above for 18 weeks plus a loose-leaf hard copy of the book. (ISBN: 9780136858140)

NOTE: If purchasing MyLab Math is not feasible please contact me or Margot Cardamone Margot.Cardamone@tufts.edu at Student Services, and we will help with this. If you do not have a reliable internet connection, please let me know, and we will figure out a good alternative.

Learning Objectives: This course satisfies Learning Objectives 1a, 1c, 1d, and 2a, 2b given in <http://ase.tufts.edu/faculty/committees/objectives/math.htm>.

Assessment: Work for the course (and the components of your final grade) will include

- **Homework:** For each lecture, you will do some computational homework problems. They will be on MyLab Math (see Important URLs below), and you should finish them by the following lecture. MyLab Math will give specific due dates and will keep track of your grades. You are encouraged to collaborate with other students on the homework and to check your solutions for mistakes. However, you must submit your own answers on MyLab Math showing all of your work.
Homework is so important for understanding that it is worth 25% of your grade.
- **Worksheets:** Worksheets with more conceptual and theoretical problems will be posted on Gradescope every week (see Important URLs). They will be due by the first class period of the following week on Gradescope. We will drop the lowest worksheet score.
Please note that worksheets are so important that they will be worth 35% of your grade.
- **Exams:** Please read the departmental exam policy here:
<http://math.tufts.edu/courses/examPolicy.htm>. Take special note of the policy on missed exams. *We do not give make-up exams for the midterms and an unexcused absence from any exam will be counted as a zero.* Excused absences are determined by the Mathematics Department on a case by case basis. Exams will be posted on Gradescope and instructions will be given in class and on Canvas.
Exams are worth 40% of your grade.

Important URLs:

- **Canvas:** <https://login.canvas.tufts.edu/> is the go-to place for everything. The “Home” page is super important and includes information about MyLab, Gradescope and other course information. Under it are the tabs for Assignments, Syllabus, Media (videos), and Zoom. The calendar (click on the “Calendar” icon on the left column) will have a link to the Zoom links for the class meetings, office hours, and TA problem sessions (this is also in the Zoom tab in the next column). The Canvas home page includes links to MyLab Math and Gradescope.
 - **MyLab Math:** <https://www.pearsonmylabandmastering.com/northamerica/mymathlab/> is the site with the assigned homework problems and the text book in eBook form. You follow the MyLab Registration Instructions on our home page on Canvas to create your account at the start of the term. You can logon it to MyLab Math from the Home screen of Canvas.
 - **Gradescope:** You will submit worksheet and test answers on Gradescope, <https://www.gradescope.com/login> (choose . The URL plus instructions are Gradescope login tab in the lower middle of the home page of Canvas).
- **Course website:** <https://courses.math.tufts.edu/math70/> for general information about the course and some practice tests and section notes. NOTE: the most current information will be on Canvas.
- **Zoom:** Class, office hours, and all meetings will be conducted by Zoom, and you can get Zoom at <https://access.tufts.edu/zoom>. It will be best to install Zoom on your computer. The Zoom URLs for the class, review sessions, and office hours will be posted on the Calendar tab and Zoom tab on Canvas.

Expectations for Participation:

When you learn online, we both need to work harder to make sure you are engaged, and here are important expectations.

- You are expected to attend and participate in every class. I plan to have time in every class for you to work on problems together, so you can participate more directly. If you cannot attend for health or other reasons, please let me know so we can make accommodations. You should then look at the class video, which I will post on Canvas soon after class.
- You are expected to do all the homework and workbook problems. This is the best way to master the material. In addition, they are worth over half of the grade.
- Everyone is expected to meet with me at least once outside of class to check up and talk about the math.
- Everyone is expected (and encouraged!) to come to office hours or make separate appointments with me whenever you have a question. Office hours are one of my favorite parts of the course.

Periodically, videos will be posted on Canvas showing fun applications of linear algebra. They will be announced in class.

Class Environment: I want us to have a safe, enjoyable learning environment that reflects a diversity of perspectives, experiences, and identities. If you feel any aspect of the class is not supportive, please let me know.

Exams: We will have two in-term tests and a final, all on Gradescope and all open-note open-book. Dates are on the schedule of classes. The two in-term exams will each last 80 minutes (see StAAR Center below) and they will be accessible starting at 4:30 p.m. Eastern Time on the indicated Thursday and must be uploaded to Gradescope before 2:45 p.m. the next day. Note that this includes the new open block, so everyone should have time for the test. The final exam will last 120 minutes and will be accessible starting at 12:00 a.m. Eastern Time on Tuesday, December 15, must be finished and uploaded to Gradescope 24 hours later. This will include the exam time originally scheduled by the university. Any changes to the exam schedule will be announced in class and on Canvas.

Grading: Suppose H is your homework average on MyLab Math, W is your worksheet average (both scaled to 100), MH is your higher midterm score, ML is your lower midterm score, and F is your score on the final exam. Your course score S is the larger of the following two quantities:

$$S_1 = .25H + .35W + .10MH + .10ML + .20F$$

$$S_2 = .25H + .35W + .10ML + .15MH + .15F$$

If you were to miss a midterm exam for a reason accepted as legitimate by the Mathematics Department, your course score S would be the larger of these two numbers:

$$S_1 = .25H + .35W + .15M + .25F$$

$$S_2 = .25H + .35W + .20M + .20F$$

StAAR Center (formerly Student Accessibility Services): Tufts University values the diversity of our students, staff, and faculty and recognizes the important contribution each student makes to our community. Tufts is committed to providing equal access and support to all qualified students through the provision of reasonable accommodations so that each student can succeed to their fullest. If you have a disability that requires accommodations, please contact the StAAR Center at staarcenter@tufts.edu or 617-627-4539 to make an appointment to determine appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision. They can be helpful, even if you are not sure if you have a documented disability. You can learn more about the StAAR Center at <http://students.tufts.edu/student-accessibility-services>.

Important Dates:

Tuesday, September 22	Last day to add a course
Tuesday, October 13	Last day for AS&E students (besides first-year undergraduates) to drop without a W
Tuesday, November 17	Last day for undergraduates to elect the PASS/FAIL option
Tuesday, November 17	Last day for <i>ALL</i> undergraduates to drop a course (first-year students can drop without a W but others receive a W)— <i>This is earlier than in the past.</i>

Math is hard! Yes, math is hard for everyone, and you should expect to work hard to understand the material. It takes effort—doing homework and workbook problems, keeping up with class, studying for tests. You should expect to struggle at first with new ideas, and that effort often goes hand-in-hand with learning and growth. This is even more true for Linear Algebra than for Calculus since you will be doing proofs and more theoretical problems. The harder you work and more you participate in class the better you will do. Talking to me, your peers, and making time to really think about the ideas in the course will go a long way towards understanding the material deeply. I'm here to help!