

## COURSE SYLLABUS

Welcome to Linear Algebra with Prof. Sal Barone! Your education and wellbeing is very important to me, for this course as well as for the rest of your time at Tech. This course will help prepare you for the linear algebra that will be used in several higher level classes that you will be taking over the next few years. There is a lot of information in the syllabus, so please read it carefully. The syllabus is essentially a contract where you can refer all semester to find answers to many of your questions about how your grade is determined and other important course policies and information. If you have any questions or concerns you can always ask me, as well.

## Instructor and Contact Information

**Instructor:** Sal Barone

**Office:** Skiles 024

**Office Hours:** MWF 10:00-11:45 and by appointment

**E-mail:** [sbarone@math.gatech.edu](mailto:sbarone@math.gatech.edu)

## Course Websites

**Instructor's Web Page:** [people.math.gatech.edu/~sbarone7](http://people.math.gatech.edu/~sbarone7)

**Course Information:** [t-square.gatech.edu](http://t-square.gatech.edu) (*required*)

**Textbook/Homework Access:** <http://www.mymathlab.com> (*required*)

**Learning Catalytics:** <https://learningcatalytics.com> (*required*)

**On-line Discussions:** [www.piazza.com](http://www.piazza.com) (*highly recommended*)

## Course Description

**Course Title:** Introduction to Linear Algebra

**Course Meeting Times:** Lecture meets Mondays, Wednesdays, and Fridays from 10:05-10:55 am in DM Smith 105.

## Lecture Assistants and Office Hours:

<i>LA</i>	<i>Email Address</i>	<i>Office Hours</i>
Bold Dorjpurev	<a href="mailto:bold@gatech.edu">bold@gatech.edu</a>	12:30 - 1:30 pm on Tuesday in Skiles 230
Yuntong Zhu	<a href="mailto:cherry.yuntongzhu@gmail.com">cherry.yuntongzhu@gmail.com</a>	12:00-1:00 pm every Tuesday
Thomas Koelle	<a href="mailto:tkoelle3@gatech.edu">tkoelle3@gatech.edu</a>	Thursdays from 4:30-5:30 PM in Skiles 230. Also, Math Lab in CULC 280 happens everyday for extra help to 1553 students. I will be there on Wednesdays from 5-6 PM.
Ruo Zhang	<a href="mailto:zhangruo1117@gatech.edu">zhangruo1117@gatech.edu</a>	10:00am to 11:00am

**Textbook:** David C. Lay, *Linear Algebra and Its Applications*, 5<sup>th</sup> ed. We will cover most of chapters 1-6.

**MyMathLab Course Information:** We will be utilizing MyMathLab (MML) for homework through a joint code for the Thomas *Calculus* text and the Lay *Linear Algebra* text. In order to register, you will need our course id listed below.

**MyMathLab Course ID: barone40138**

Important notes on MML:

- If you already have an account on MyMathLab using this combined textbook within the past 18 months, then you do not need to purchase a new code. Login to your account on MyMathLab, select the option to add a new course, and enter our course ID.
- If you already have a MyMathLab account that used either the Thomas or the Lay textbook in the past 18 months, but you were unable to add our course using the previous step, please send an email to [gatechmath@yahoo.com](mailto:gatechmath@yahoo.com) and include the following information:
  - 1 Your First and Last Name
  - 2 The email address used to register for MML
  - 3 Your Login ID for MML
  - 4 Our course ID (listed above)

You should receive a reply within 36 business hours from the Pearson support team regarding your account status. In the meantime, you can access our course using the “temporary access” option when registering. Please do not pay for a new code until you receive a reply from Pearson.

- If you do not have a MyMathLab account using the Thomas or Lay textbooks, or if your account is over 18 months old, you will need to purchase a new code for our course. Please refer to the registration document, located in the “Resources” section on t-square, to create your new account.

***When signing up for MyMathLab, it will be immensely helpful to me (for grading purposes) if you will set your STUDENT ID to your USERID for the GT system (i.e., your T-square USERID, as in “gburdell3”, etc).***

MyMathLab comes with an entire electronic version of the textbook; it is your choice if you would also like to own the textbook in print. You may purchase a MyMathLab code either from the bookstore or on-line while registering at <http://www.mymathlab.com>. If you prefer to own a hardcopy of the text, the bookstore offers packages of MyMathLab combined with a loose-leaf or hardcover version of the Thomas and/or Lay textbook(s) that is less expensive than purchasing the text(s) and code separately.

**PLEASE NOTE:** Georgia Tech has a special code package that includes both textbooks. This code can only be purchased through the campus bookstores or directly from Pearson. Codes purchased by other vendors will not work! Possible ISBNs for this text are: 1323131760, 1323132112, 132313204X, 1323132104, or 1323132120.

### Course Objectives

This is a basic, first course in linear algebra. The main goals are to understand matrices and systems of linear equations, to learn to solve problems from a mathematical perspective, and to prepare for the many applications of linear algebra in other science and engineering courses. Specifically objectives include:

- To learn to solve systems of linear equations through the use of matrices, including the methods of row reduction, inverse matrices, and LU decompositions.
- To understand the set of all solutions of a system of linear equations - with varying parameters - specifically through the parametric forms for solutions, the geometry of linear transformations, the characterizations of invertible matrices, and determinants.

- To learn to solve eigenvalue problems through the use of the characteristic polynomial.
- To use the computation of eigenvalues and eigenvectors to understand the structure of a linear transformation, for instance by diagonalization.
- To understand orthogonal projections and how they are used to find best-fit solutions to systems of linear equations that have no actual solution.

### Course Organization

This course will consist of lectures meeting three times per week for 50-minute periods. You are required to attend all scheduled sessions at all times. After the first week of class, Fridays will be reserved for review and testing.

### Study Groups

The School of Mathematics and the Center for Academic Success will be organizing study groups this spring for students enrolled in Math 1553. These groups will meet in the Math Lab, Clough 280, from 5:00-6:00 pm on Mondays-Thursdays and from 11:00 am-12:00 pm on Tuesdays and Thursdays. During these times, lecture assistants for Math 1553 will be available to assist in your studying.

### Course Requirements and Grading

**HOMEWORK:** Homework will be assigned on-line and will consist of exercise problems on MyMathLab. You are expected to understand **all** homework problems for the tests and quizzes. Exercises on MyMathLab will be due every Thursday at 11:59 PM (except during class recesses or as announced in class). Please note, there may be more than one section due each Thursday. In addition to the online assignments, one written problem will be assigned each week. Written solutions to that problem will be due **at the beginning of class** each Friday. The lowest homework grade will be dropped. **No late homework will be accepted.** Please note: *the final graded homework assignment will be due on Thursday, April 21.*

**PARTICIPATION:** Class participation will be based on your attendance in the lectures. We will use Learning Catalytics (learningcatalytics.com) to measure lecture attendance, beginning on the second week of classes. Learning Catalytics is free with your subscription to MyMathLab. You will need to bring an internet capable device (smart phone, tablet, laptop, etc) to class each day in order to access the questions.

**QUIZZES:** A weekly quiz will be given each Friday beginning on the second week of classes, except on test days. Quizzes will be administered during the last 10 minutes of class, and will be based on the homework assignments due that week. The lowest quiz grade will be dropped. No books, notes, calculators, cell phones, or other electronic devices are allowed during the quizzes.

**MIDTERMS:** We will have three 50-minute midterm exams during the term. Tests will be administered on the following days:

- Midterm 1: Friday, February 12
- Midterm 2: Friday, March 11
- Midterm 3: Friday, April 8

No books, notes, calculators, cell phones, or other electronic devices are allowed during the tests and quizzes.

**FINAL EXAM:** The final exam will cover all course materials and will be administered on **Fri Apr 29<sup>th</sup> 11:30 AM for MWF 9am class and Fri Apr 29<sup>th</sup> 8:00 AM for MWF 12pm class.** All students must take the final examination. *Note the unusual day on Friday BEFORE the “typical” finals week!*

*Your final average will be computed as follows:*

<b><i>Assessment</i></b>	<b><i>Percentage of Average</i></b>
Participation	5%
Homework (lowest dropped)	10%
Quizzes (lowest dropped)	10%
Midterms (15% each)	45%
Final Exam	30%

If it helps the overall average, the lowest midterm score will be halved at the end of the semester and the final exam will count for an additional 7.5%.

*Letter grades will be determined based on the following intervals. **You will be guaranteed a minimum of the following grading scale, but do not expect any adjustments:***

**A:** 90% and higher, **B:** [80%, 90%), **C:** [70%, 80%), **D:** [60%, 70%), **F:** [0%, 60%).

**Midterm grades** will be assigned on **February 19**. A satisfactory grade will be assigned to all students with a midterm average of 70% or higher (based on the above weighting of grades).

### **Class Policies**

**Attendance:** You are expected to come prepared and actively participate in every lecture and recitation session. Attendance in lecture will be taken by use of Learning Catalytics. In the event of an absence, you are responsible for all missed materials, assignments, and any additional announcements or schedule changes given in class.

Class disruptions of ANY kind will NOT be tolerated and may result in your removal from the classroom and/or loss of participation points for that day.

Please show courtesy to your fellow classmates and instructor by adhering to the following class rules:

- Turn off all laptops, cellular phones, i-pods and other electronic devices, unless you have a *documented* need to use such devices for note-taking, during class.
- Come to class on time and stay for the entire class period.
- Refrain from conversing with your fellow students.
- Put away any reading materials unrelated to the course.

**Academic Dishonesty:** All students are expected to comply with the Georgia Tech Honor Code (the honor code can be found at <http://www.policylibrary.gatech.edu/student-affairs/code-conduct>). Any evidence of cheating or other violations of the Georgia Tech Honor Code will be submitted directly to the Dean of Students. Cheating includes, but is not limited to:

- Using an unapproved calculator, books, or any form of notes on tests.
- Copying directly from **any** source, including friends, classmates, tutors, internet sources (including Wolfram Alpha), or a solutions manual.
- Allowing another person to copy your work.
- Taking a test or quiz in someone else's name, or having someone else take a test or quiz in your name.
- Asking for a regrade of a paper that has been altered from its original form.
- Using someone else's Learning Catalytics login to gain attendance points or to take quizzes or tests for them, or asking someone else to use your Learning Catalytics login for any graded or attendance submission.

**Regrading of Papers:** If a problem on your test has been graded in error, you must submit a regrade request to me (not your TA!) **in writing**, along with your paper, no more than *one week* after the tests have been returned in class. Should you wish to have your paper regraded, *do not change or add to the work on your paper!* If you must write on your returned paper, be sure to write in a different color ink and clearly indicate what you have added. A regrade request can only be submitted if you have done something **CORRECT** on your test that has been marked as incorrect. You **MUST** check your answers with the solutions **BEFORE** submitting such a request.

**Make-Ups:** In an emergency situation, I may allow a make-up test if I am notified prior to the exam and provided with a reasonable, **written** confirmation of your absence. Any make-ups must be completed before the corresponding test has been graded and returned to other students. If you will miss a test due to a university-sponsored event or athletics, please provide me with the official documentation in advance.

**Students with Disabilities and/or in need of Special Accommodations:** Georgia Tech complies with the regulations of the Americans with Disabilities Act of 1990 and offers accommodations to students with disabilities. If you are in need of classroom or testing accommodations, please make an appointment with the ADAPTS office to discuss the appropriate procedures. More information is available on their website, <http://www.adapts.gatech.edu>. Please also make an appointment with me to discuss your accommodation, if necessary.

**Calculators:** While you may need a scientific calculator for help with some of the homework problems, the use of calculators is **NOT ALLOWED** on in-class assessments.

**Announcements:** I will frequently update the class pages with class information and materials. *You are responsible for obtaining any announcements or materials placed on my web page, MyMathLab, or T-square.* Though not required, it is also to your advantage to join our class page on Piazza ([www.piazza.com](http://www.piazza.com)) so you can view/participate in course-related discussions.

**Additional Help:** *Asking questions is a key to success!* Please stop by my office hours or your LA's office hours whenever you have questions. Free help is also available Monday-Thursday in the Math Lab, located on the second floor of Clough Commons.

**Please note:** *items on the syllabus and course schedule are subject to change. Any changes to the syllabus and/or course schedule will be relayed to the students in class and through e-mail.*

### **Important Dates Throughout the Term**

11 January -- First Day of Classes  
18 January -- Official School Holiday (MLK)  
12 February -- Test #1  
11 March -- Test #2  
16 March -- Last day to withdraw with a grade of "W"  
21-25 March -- Spring break (NO CLASS)  
8 April -- Test #3  
25 April -- Last Day of Classes  
29 April -- Final Exam

## Tentative Course Schedule

Please use this as an approximate class schedule; section coverage may change depending on the flow of the course.

<i>Week and Dates</i>	<i>Section Coverage</i>	<i>Topics</i>
Week 1 January 11-15	Sections 1.1-1.2	Gauss-Jordan Elimination
Week 2 January 18-22	Sections 1.3-1.4	Vector and Matrix Equations <i>Homework #1 due Thursday, Quiz #1 on Friday</i>
Week 3 January 25-29	Section 1.5 Section 1.7	Linear Systems Linear Independence <i>Homework #2 due Thursday, Quiz #2 on Friday</i>
Week 4 February 1-5	Sections 1.8-1.9	Linear Transformations <i>Homework #3 due Thursday, Quiz #3 on Friday</i>
Week 5 February 8-12	Section 2.1 Test Review	Matrix Operations <i>Homework #4 due Thursday</i> <i>Midterm #1 on Friday (Chapter 1)</i>
Week 6 February 15-19	Sections 2.2, 2.3	Inverses <i>Homework #5 due Thursday, Quiz #4 on Friday</i>
Week 7 February 22-26	Section 2.5 Section 2.8	LU Factorization Subspaces <i>Homework #6 due Thursday, Quiz #5 on Friday</i>
Week 8 February 29-March 4	Section 2.9 Section 3.1	Dimension and Rank Determinants <i>Homework #7 due Thursday, Quiz #6 on Friday</i>
Week 9 March 7-11	Section 3.2 Test Review	Properties of Determinants <i>Homework #8 due Thursday</i> <i>Midterm #2 on Friday (Chapters 2 &amp; 3)</i>
Week 10 March 14-18	Sections 5.1-5.2	Eigenvalues and Eigenvectors <i>Homework #9 due Thursday, Quiz #7 on Friday</i>
Week 11, March 21-25	SPRING BREAK	NO CLASS
Week 12 March 28-April 1	Section 5.3 Section 5.5	Diagonalization Complex Eigenvalues <i>Homework #10 due Thursday, Quiz #8 on Friday</i>
Week 13 April 4-8	Section 6.1 Test Review	Inner Products <i>Homework #11 due Thursday</i> <i>Midterm #3 on Friday (Chapter 5)</i>
Week 14 April 11-15	Sections 6.2-6.3	Orthogonal Sets and Projections <i>Homework #12 due Thursday, Quiz #9 on Friday</i>
Week 15 April 18-22	Sections 6.4-6.5	Gram-Schmidt and QR Factorization Least-Squares <i>Homework #13 due Thursday, Quiz #10 on Friday</i>
Week 16 April 25-26	Final Instructional Days	Review for Final Exam <i>Final Exam on Friday, April 29, 8AM (for MWF 12pm class) or 11AM (for MWF 9am class)</i>

