Math 1564 K01, K02 Syllabus
Linear Algebra with Abstract Vector Spaces Fall 2026

Course Information

- **Lectures:** Tuesday & Thursday 12:30-1:45pm
- **Studios:** Monday & Wednesday 11-11:50am (K01), 12:30-1:20pm (K02)
- **Instructor:** Igor Belegradek ib@math.gatech.edu
- **Term:** Fall 2026
- **Course:** Math 1564, K01, K02, 4 credit hours
- **Office:** Skiles 240b
- **Office hours:** TBD

Course Description

- This is an intensive course on linear algebra, taught at a sophisticated and abstract level. It is designed for students who plan to eventually take 4000 level math courses. This isn't a course for students who seek to avoid abstract mathematics. Other introductory linear algebra courses at Georgia Tech are less theoretical, but not necessarily easier.
- The course will cover linear systems, matrix algebra, vector spaces and there bases, determinants, eigenvalues, eigenvectors and diagonalization, Markov chains, orthogonal projections and best fit, and Jordan form.
- We won't prove everything, but there will be a substantial amount of proofs in lecture, quizzes, tests, and the final. The goal here is to ease the transition from recipe-based math courses like Calculus to higher level math courses. Linear algebra may be the best subject for the first exposure to rigorous proofs.
- Why proofs? Mathematical facts cannot be tested by experiment. A proof is a substitute. Checking its correctness is similar to testing a computer code. When dealing with not so intuitive objects, proofs serve as a safeguard. Once intuition is developed, proofs become less important, and one can transition to post-rigorous thinking.

Course Learning Outcome

Upon successful completion of the course, the student will

- master all basic topics of linear algebra except for the Singular Value Decomposition, and
- be able to follow and write basic mathematical proofs, and
- be exposed to the numerical linear algebra via Matlab.

Prerequisites

Formal prerequisites: Score of 5 in AP Calculus BC or A in MATH 1552 or equivalent or permission from Academic Office. No previous exposure to proofs or knowledge of linear algebra is assumed.

Required Course Materials

There is no required text. The course will be taught from Instructor's notes. An optional textbook is Lay, *Linear Algebra and its Applications*, 6th Edition. Older editions are fine for our purposes. If you have taken Thomas *Calculus* at Georgia Tech in the past 18 months, you can access Lay's textbook as an ebook in your MyMathLab account.

Grading Policy

- Grading scale: A=90%, B=80%, C=70%, D=60%.
- Grades will not be "curved", that is, performance of your fellow students will have no effect on your grades. There is no set quota for the number of A's, B's etc, in particular, it is possible in theory that everybody will get an A.

Assignments

- The cumulative final is 30% of the final grade.
- There will be three midterms in the studio on 9/23, 10/21, 11/18. The midterms are on Wednesdays. Here 9/23 means September 23rd, etc. The three midterms are worth 36% of the final grade.
- A midterm with the lowest *positive* score will be dropped; thus a missed midterm cannot be dropped.
- Class participation is worth 4% of the final grade. If you are not sufficiently participating in class, you will be asked to attend the office hours to discuss homework, which is how the participation grade will be determined.
- Online homework dealing with non-theoretical aspects of linear algebra will be worth 10% of the final grade.
- (Somewhat more) theoretical homework will be assigned weekly but not graded (AI can solve it).
- Weekly quizzes will be based on theoretical homework and in total are worth 20% of the final grade.

- The quizzes will be every Wednesday in the studio, except when there is a midterm. Thus the quizzes will be on 9/2, 9/8, 9/16, 9/30, 10/7, 10/14, 10/28, 11/4, 11/11, 12/2. Thus each quiz is worth 2% of the final grade.
- A quiz with the lowest *positive* score will be dropped; thus a missed quiz cannot be dropped.
- Rules for Quizzes, Midterms and the Final: no use of outside resources or help, closed books and closed notes.
- How to succeed: do all homework, internalize homework solutions, read class notes, and ask lots of questions. This is the best way to prepare for quizzes and the Final. The problems in Quizzes/Final will be similar in style to theoretical homework (except easier).

Attendance and Participation

- This will be an active classroom, where the students are expected to participate. The students who attend and participate usually learn more and get a better grade. However, the attendance won't be taken, and it is acceptable to miss a class for good reasons, e.g., illness, job interviews, GaTech approved events, etc.
- Quizzes *cannot* be made up. If you miss a quiz for a valid reason, it will be dropped, which will make other quizzes worth more. To qualify email me promptly.
- Midterms *can* be made up if missed for a valid reason. To qualify email me promptly.
- In accordance with Title II of the Federal Law, only accessible files can be posted on Canvas for student usage. Unfortunately, that means the instructor may not share the handwritten class notes. Thus you will need to attend the class, and take good notes yourself. The classes will not be recorded.

Collaboration, Group Work, and Use of Generative AI

- Working on homework in groups is encouraged. Feedback from other students will help you learn.
- Attending office hours is encouraged. The more you talk to me, the more you learn.
- Freely available AI can solve all linear algebra exercises at the level of this course. It is okay to use AI as a personal tutor and homework helper. I would not overdo it though, because you will need to develop enough independent understanding to perform well on quizzes and the final. Also don't forget that AI can make mistakes.
- I recommend that you make a serious attempt on every homework problem and then, if you choose to use AI, make sure you fully understand the solutions. This is not the same as figuring it out yourself, but still better than nothing. In general, solving a harder math problem is a process, and you should not expect to finish it in one sitting.

Important dates

- Math 1564 will start on 8/24 (Monday) in the studio.
- Math 1564 lectures will start on 8/25.

- 8/28 is the last day to drop without a W grade, register or make schedule changes.
- 10/31 is the last day to withdraw with a W grade.
- Quizzes will be every Wednesday in studio.
- Midterms will take place in the studio on 9/23, 10/21, 11/18.
- No classes on 9/7 (Labor day), 10/5-10/6 (Fall Break), 11/25-11/27 (Thanksgiving).
- 12/8 is the last day of classes.
- Final exams will be during 12/10-12/17.
- Math 1564 final exam date is not yet known, and will be available in August.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct. Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations. *Examples of cheating* on quizzes or tests:

- use of unauthorized materials,
- getting outside help, be that from a person or an online resource,
- helping another student with their test.

Core IMPACTS

This is a Core IMPACTS course that is part of the Technology, Mathematics, and Sciences area.

- Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help master course content, and support students' broad academic and career goals.
- This course should direct students toward a broad Orienting Question: How do I ask scientific questions or use data, mathematics, or technology to understand the universe?
- Completion of this course should enable students to meet the following Learning Outcome: Students will use the scientific method and laboratory procedures or mathematical and computational methods to analyze data, solve problems, and explain natural phenomena.
- Course content, activities and exercises in this course should help students develop the following Career-Ready Competencies: Inquiry and Analysis, Problem-Solving, Teamwork.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulates some basic expectations that you can have of me and that I have of you. Additional information for research-related work is given in The Expectations of Advisors and Advisees. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Inclement Weather and Digital Learning Days

If a weather-related event affects campus operations, the class will take place in Zoom.

Undergraduate Student Academic Success Resources

A list of resources for undergraduate students' academic success and information about advising can be found at Success at Tech.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being.