

# MATH 3406 Syllabus

A Second Course on Linear Algebra, Section K/M, 3 credit hours

Fall 2026

## Instructor Information

Instructor: Alex Dunbar

Email: adunbar30@gatech.edu

Office: Skiles 017

Office Hours: TBD

## General Course Information

### Description

This course will cover topics in linear algebra not usually discussed in a first-semester course, featuring a mixture of theory and computation. This advanced undergraduate course in linear algebra will be of interest to Math, Computer Science, and Physics majors. It may also be of interest to undergraduates in Engineering and other units.

Topics will include

- Abstract Vector Spaces and Linear Maps
- Eigenvalues and Eigenvectors
- Operators on Inner Product Spaces
- Matrix Decompositions

### Course Learning Outcomes

Linear algebra is at the core of almost every field of pure and applied modern mathematics. It is also a great subject for learning the process of mathematical study. This course has 3 content goals and 2 process goals.

Upon successful completion of this course, you should be able to...

- State and understand the basic properties of abstract vector spaces and linear maps and how these generalize the concepts you have learned in a first linear algebra class. (Content Goal)
- Compute and interpret eigenvalues and eigenvectors of linear maps. (Content Goal)
- Understand how inner products give additional structure to vector spaces and linear maps. (Content Goal)
- Use proof techniques including contradiction, contraposition, and induction to reason about abstract mathematical objects. (Process Goal)
- Use computational resources to assist in understanding abstract linear algebraic objects. (Process Goal)

### Prerequisites

A first course in linear algebra at the level of MATH 1553 or MATH 1554 or MATH 1564 or MATH 1502 or MATH 1512 or MATH 1522 or MATH 1X53.

This will be a **primarily proof-based class**. You do not need to have taken a formal introduction to proofs class; however, you should be willing to learn to think logically and abstractly!

We will do some computing in this class. While this is **not** a numerical linear algebra class, we will touch on some computational topics. No prior experience with coding is assumed.

## Required Course Materials

**Textbook:** *Linear Algebra Done Right* by Sheldon Axler. Available for free online at <https://linear.axler.net/>. Note that the website links to videos corresponding to many sections of the book.

**Computing:** Some exercises will require computing. You may use MATLAB, Python, or Julia. Georgia Tech provides MATLAB to students: [https://gatech.service-now.com/home?id=kb\\_article\\_view&sysparm\\_article=KB0043889](https://gatech.service-now.com/home?id=kb_article_view&sysparm_article=KB0043889). Once you have registered with MATLAB, you can use <https://matlab.mathworks.com/> to compute in your web browser. If you prefer Python, you can use <https://colab.research.google.com/> to run Python in your web browser.

## Course Websites:

- Canvas Page: [gatech.instructure.com](https://gatech.instructure.com)  
Canvas will be used for course grades, announcements, accessing WeBWorK, and signing up for Gradescope/Piazza.
- Piazza Discussion Board: [piazza.com](https://piazza.com)  
The Piazza forum is highly catered to getting your help fast and efficiently from classmates, the TAs, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza if your questions have nothing to do with your privacy. The only restriction on questions I impose on Piazza is: please do not discuss exam problems until after grades are released.
- Gradescope: Grading of quizzes and exams will be done on Gradescope. The first time you access Gradescope will be through Canvas, after which you can go directly to [gradescope.com](https://gradescope.com).

## Grading Policy

The overall course grade will be based on participation, weekly homework assignments, two midterm exams, and a final exam. The grading percentage breakdown is

## Assignments

- Participation – 5%
- Homework – 20%
- Midterm 1 – 25%
- Midterm 2 – 25%
- Final Exam – 25%

After *all* grades are in and all overall percentage scores for students have been computed using the weights described above, grades are assigned. The standard cutoffs are as follows.

A: [90%, 100%]   B: [80%, 90%)   C: [70%, 80%)   D: [60%, 70%)   F: [0%, 60%)

I reserve the right to adjust these intervals down at the end of the semester. The intervals will not be made stricter (e.g., 70% will be no worse than a C after adjustments.) So, to guarantee an A, get 90% or better overall. To guarantee at least a B grade, get 80% or better overall, etc.

**Individual requests to round grades up at the end of the semester will not be granted.**

## Description of Graded Components

**Participation** Math is learned best through active participation. You are expected to participate in class and on Piazza. To earn full credit for participation, you are expected to ask or answer **at least 5** questions in class or on Piazza throughout the semester. When you participate in class please submit the corresponding Participation assignment in Canvas describing your participation. These will be marked complete/incomplete. **I will only grade participation assignments submitted through Canvas within one week of the participation.**

**Homework** Homework will be given approximately weekly with 11 assignments over the course of the semester. You are encouraged to collaborate with each other on the homework assignments. However, direct copying of an assignment from any source is strictly forbidden. Please list your collaborators on your submission.

It is my philosophy that assigned homework reflects the minimum amount of practice needed to develop an understanding of the material. **In order to succeed in the class, I highly recommend that you practice exercises in the book which are not required homework.**

Each homework assignment will be graded out of 10 points, for a total of 110 available homework points. Grades for the homework category will be taken out of 80, with a cap of 80 (that is, no extra credit).

**Exams** There will be two midterm exams during the semester and one final exam. The final exam date and location is set by the registrar. No books, notes, calculators, cell phones, or other electronic devices are allowed during exams.

Tentative dates and topics for the exams are listed below:

- Midterm 1: September 30, Ch 1-3 in Axler
- Midterm 2: November 11, Ch 5-7B in Axler
- Final Exam: TBD, cumulative

**Regrades** Exams will be graded through Gradescope. Once an exam is graded, you will have one week to submit a regrade request. Regrade requests that do not explain why your solution is correct and which rubric item [#] should be applied will not be considered. A regraded paper may be regraded up **or down**, so please check the answer key before submitting a regrade request. Only exams are eligible for regrade requests.

## Course Policies

### Attendance and Participation

Attendance for lectures is not mandatory; however, it is highly encouraged. See the above section for the description of participation expectations.

### 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.

## Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) 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 Agreement

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 articulate some basic expectations that you can have of me and that I have of you. 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.

## Extra Credit Opportunity

If both sections reach a combined CIOS response rate of 80%, I will add an extra credit reflection question to the final exam. There are no other extra credit opportunities.

## Collaboration, Group Work, and Use of Generative AI

Working together with your friends and classmates on your homework is encouraged; however, copying from any source is prohibited. You may use AI and other tools to help you get started on your homework, but **relying heavily on these will likely result in poor performance on exams if you do not develop your own understanding of the material**. AI tools also frequently make mathematical errors, so be careful in applying them. You may use the built-in generative AI tools to assist with computational assignments (e.g., Gemini integration in Google Colab).

In your homework submissions, list any collaborators and if/how you used generative AI tools.

## Extensions, Late Assignments, & Re-Scheduled/Missed Exams

If you have to miss class on a day when an exam is scheduled due to sickness, institute approved absence, or any other personal emergency, I will work with you to make up the assessment as long as you are in communication with me in a timely manner.

- **University-approved absences:** Please give me notice by the second Wednesday of the semester, or as soon as possible once your absence has been approved.
- **Religious holiday:** By the second Wednesday of the semester, you should notify me of any classes you will miss due to religious holidays.
- **Illness:** Except under extenuating circumstances, you should notify me *in advance* and for cases where you are ill enough to need medical care, provide the Office of Student Life with appropriate documentation, so that they can confirm it with me. Illnesses such as COVID, colds, flu, or other such illnesses where you feel unwell and don't want to infect others but do not feel ill enough to visit a doctor do not need documentation.
- **Family or personal emergency:** Notify me as soon as possible and when applicable (for extended absences) provide the Office of Student Life with appropriate documentation, so that they can confirm it with me.

**If you do not communicate with me about your absence to set up a make-up opportunity within 24 hours of the missed exam, then the missed exam will be scored as a 0.**

If you have an excused absence for a midterm, then you will need to take the make-up exam, with date TBD. If this is not possible, then the missed exam grade will come from the average of the other midterm and the final exam.

Except in extremely rare circumstances, only one make-up exam per student is allowed. If a second make-up exam is required for any reason, then instead the second missed exam grade will come solely from the final exam.

There are no extensions or make ups allowed for homework.

## **Inclement Weather and Digital Learning Days**

In cases where campus may be physically closed due to events such as inclement weather, a digital learning day may replace in-person classes. Should this event occur on a lecture day, then lectures will either be streamed live, or a recording will be posted for students to watch asynchronously. Should this event occur on a studio day, then studios will be streamed live if possible or a recording will be posted for students to watch asynchronously (possibly after the digital learning date). If a digital learning day occurs on a midterm exam date, then class lectures will meet online or asynchronously instead, and that exam will be rescheduled to the next lecture day.

## **Student Use of Mobile Devices in the Classroom**

Please ensure that your mobile devices are turned off or set to silent mode during class and refrain from use when possible. If you need to make a call, please step out of the classroom to do so.

While there is not a strict ban on devices on lecture days, they are highly discouraged. From the CTL Website:

“Research on learning shows that unexpected noises and movement automatically divert and capture people’s attention, which means that one student’s use of a mobile devices (laptops, cell phones, tablets, etc.) can distract another student, thus disrupting their ability to learn. In addition, students using mobile devices often become engaged in matters that are not related to the class they are attending. Further, research indicates that students taking notes on laptops tend to process less as they take notes, and the depth of their learning suffers.”

You are not permitted to access a mobile device during an exam. **If you are caught using a mobile device during an exam, with the exception of devices allowed by accommodation policies, you will be reported to OSI.**

## **Emails**

I will respond to emails within one to two business days. Emails sent on the weekend will receive a response on Monday. If I have not responded within this time frame, I likely missed your email, so please send a follow up.

For questions relating to course structure, please check the syllabus first. Exam dates are available on the syllabus.

Let’s not discuss grades by email. Any questions about grades should be asked during office hours or in an appointment scheduled outside of office hours. **In particular, do not send me emails at the end of the semester asking for your grade to be changed. They will not help in any case.**

## **Campus Resources for Students**

### **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

### **Graduate Student Academic and Professional Success Resources:**

A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- Professional Development such as the programming from the Career Center and other professional development resources and events

**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.