

*“So, why do we need teachers? Well, if you think that the fundamental job of a teacher is to transmit information from their head to their students, then you’re right, they are obsolete... Luckily, the fundamental job of a teacher is not to deliver information. It is to guide the social process of learning. The job of a teacher is to inspire, to challenge, to excite their students to want to learn. Yes, they also do explain and demonstrate and show things, but fundamentally that is beside the point. The most important thing a teacher does is make every student feel like they are important – to make them feel accountable for doing the work of learning.” – Derek Muller of the YouTube channel Veritasium, from the video “The Most Persistent Myth”*

## **ECE 3084 Syllabus**

Signals and Systems, 3 Credits

Summer 2026

Asynchronous delivery: There will be no requirement for students to electronically “attend” lectures at a particular fixed time.

### **Instructor Information**

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**Instructor: Aaron Lanterman**

**Email: [lanterma@ece.gatech.edu](mailto:lanterma@ece.gatech.edu)**

### **General Course Information**

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#### **Description**

Continuous-time linear systems and signals, their mathematical representations, and computational tools; Fourier and Laplace transforms, convolutions, input-output responses, stability.

The subject area of signals and systems is perhaps the most important in all of science and engineering in that it provides the abstractions that allow us to reason about pretty much everything – from electrical circuits to self-driving cars. This course investigates signals and systems via Fourier and Laplace transforms, linear systems theory, and applications drawn from many aspects of electrical engineering.

## Course Learning Outcomes

- Express continuous-time signals in mathematical form
- Define and apply the Fourier transform
- Analyze signals in terms of their frequency contents
- Describe system behavior in terms of the Fourier transform
- Apply the Laplace transform
- Solve linear, ordinary differential equations using the Laplace transform
- Derive transfer function representations of linear systems
- Relate system stability to the properties of the transfer function
- Explain the role of feedback in linear systems
- Describe how continuous-time signals and systems are used in engineering applications

## Prerequisites

ECE2026 and (ECE2040 or (ECE3710 and MATH 2552/2562/2X52)) [min C on all]

## Course Materials

### Only the first is required:

- Lanterman, Michaels, and Egerstedt, *Signals and Systems for All Electrical Engineers* (**required reading**; a work in progress with updated drafts posted to Canvas)
- McClellan, Schafer, and Yoder, *Signal Processing First*, Prentice Hall (if you can acquire an inexpensive copy, you will find that chapters 9-12 map fairly closely to the first half of ECE3084)
- Chen, *Signals and Systems: A Fresh Look*, available for free at <https://archive.org/details/freshlookrev>

## Grading Policy

The grade distribution will be as follows: Homework & Canvas Quizzes: 80%; Final Project: 20%.

The homeworks will be graded out of 100 points. The canvas quizzes will each be worth a much smaller amounts of points that will vary quiz to quiz.

Letter grades will be assigned based on traditional breakdowns: 90%-100%=A; 80%-89%=B; 65%-79%=C; 50%-64%=D; below 50%=F.

## Description of Graded Components

There will be approximately 9 homework sets, and numerous tiny Canvas quizzes, with each individual quiz largely associated with a particular posted video, and largely intended to make sure you've watched the video. The quizzes will have generous time limits and a wide span of time in which they can be conducted. The quizzes will be open book, open notes, open internet search engine, etc. – you can rewatch the related video, or any of the videos, etc. The only thing I ask you not to do on the quizzes is ask another human for help besides me or the TA.

After giving the situation a lot of thought, I've decided to try not having high-stakes exams this semester, like one or two big midterms and a final. Instead, each student will do a final project. The project will largely be highly individual, tailored towards *your* personal skills and interest, and designed to offer an authentic experience engaging with the course material. The project will be due at 8:50 pm on Thursday, August 6, which matches the end of finals, as is appropriate for an “alternative” final assessment in an asynchronous course.

Homework will be divided between handwritten problems (most) and programming assignments (a few). MATLAB will be used for the programming assignments; you can also use the open source equivalent Octave. Each of you is expected to turn in homework that is completely your own work, but you are encouraged to discuss problems and solution approaches with others. Be sure to attempt each problem on your own before seeking help. Working homework is the best way to learn the material. **Using solutions from previous offerings of ECE3084, beyond what you may have collected yourself from taking it in previous semesters, is forbidden.** Homework must be neat and well-organized or it may not be graded or may have points deducted. **Be sure to put your name, date, section, and the assignment number on the front page or on a cover sheet.** Homework will be uploaded to Canvas. If you hand-write homework, please scan it or take high resolution photographs organized into a single PDF document. If you do your

homeworks electronically in a note taking application like OneNote, you can export a PDF directly from that.

If you are unable to complete a homework by the given deadline, turn in what you have done for partial credit so you can move on to the next assignment. (In the case of extreme circumstances, contact me to discuss).

## Course Logistics

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### Canvas

Canvas (<http://canvas.gatech.edu>) is the primary means of distributing information. Homework assignments and will be posted on Canvas. The following information will also be found on Canvas as it becomes available: (1) homework solutions, (2) class grades, (3) this syllabus, (4) links to lecture videos, and (5) miscellaneous handouts. **Providing private information from the Canvas website to other individuals, particularly students taking future offerings of this class, or uploading such information to websites or shared Google drives, etc., is strictly prohibited.**

### On-Line Discussions

We will Discord facilitate class discussions. I usually have Discord running whenever I am using my laptop. Please post questions about anything related to the course material, and also answer other students' **general** questions, but **don't give away answers to homework problems** or post chunks of code that are more than a few lines. However, please **don't** publicly post questions about the **quizzes**, or answer such questions if you see them. Quiz questions should only be discussed with the instructor or the TA.

## Course Policies

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### Attendance and/or Participation

Although an asynchronous class does not require class attendance in the usual sense, you will need to be self-motivating and disciplined to avoid running behind on watching the lecture videos. You will need access to a computer and a reasonably reliable internet connection. You will not need to have a webcam or microphone, although such affordances may be handy for meeting over Zoom if desired.

### Major Emergencies

If you have some sort of major life emergency – serious illness or injury, death in the family, house burns down or is flooded, etc. – that seriously impedes your progress in the class,

please let me know as soon as possible so we can work something out. You will find professors can be quite reasonable if you keep us in the loop. Please don't disappear with no warning half way through, making us think that you dropped the class, and then reappear out of nowhere the week before finals asking what you can do to make things up.

### **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.

**The use of backfiles – i.e., solutions from previous offerings of this class – is strictly prohibited. Providing private information such as homework solutions to other individuals, particularly students taking future offerings of this class, or uploading such information to websites or to shared Google drives, etc., is strictly prohibited.**

### **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.

## Campus Resources for Students

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### **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 ([student-resource-guide \(gatech.edu\)](#))