

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

ECE6500

Summer Semester, 2026

TITLE: "Fourier Techniques and Signal Analysis"

COURSE DELIVERY: 100% Web-based, asynchronous plus optional synchronous help sessions

INSTRUCTOR: Professor Ali Adibi

CONTACT INFORMATION:

Office: 103 Bunger Henry Building, Phone: (404)385-2738, Email: adibi@ece.gatech.edu.

OFFICE HOURS AND HELP SESSIONS: Tuesday 6:00-7:15 PM, Saturday 10:00 AM-11:15 AM. Participation is highly encouraged and provides opportunities for extra credit.

GENERAL COURSE INFORMATION

GENERAL OVERVIEW

ECE6500 provides an introduction to the use of Fourier methods for analysis of signals along with potential applications.

COURSE OBJECTIVES

By the end of the course, the students will be able to explain and implement the fundamental concepts of: 1) frequency-domain representation of signals and their relation to the spatial or temporal domain through Fourier transformation, 2) main properties of Fourier transform, 3) convolution and correlation operators and their effects on the Fourier domain, 4) impulse function, its different representations and applications, 5) important theorems in Fourier analysis and their use in facilitation of the calculation of Fourier transform of complex signals, 6) Application of Fourier transform in circuit and system analysis, 7) sampling theorem and its application in discrete signal processing. These provide the students with the necessary background for explaining the relation between the time and frequency domain representations of signals and the application of Fourier techniques in the analysis of different physical systems (e.g., electronic circuits, optical imaging systems, etc.)

TEXTBOOK:

R.N. Bracewell, The Fourier Transform and its Applications, Third Edition,

PREREQUISITES:

None

COURSE PRESENTATION:

Lectures

Recorded (asynchronous) class lectures will be provided on Canvas. Synchronous help sessions will be held during office hours using Zoom/TEAMS with focus on course summary and problem-solving capabilities.

COURSE ASSESSMENT AND GRADING

Homework

Homework assignments will usually be issued each week and will be due the following week (unless there is an exam that week). The due date and time of each homework is clearly specified on the homework sheet. If not specified, the homework will be due at 11:59 PM of the due date.

Late and Makeup Homework

Late homework is accepted, but there will be a 20% penalty for each day. Extensions can be requested from the instructor; they may be granted under reasonable conditions assessed by the instructor. Collaboration on homework problems is allowed and encouraged. However, each student must write the solution alone.

Exams

There will be two midterm exams and one comprehensive final exam. The exams will be Web-based. All exams will be closed book and notes. However, a one-page formula sheet will be allowed (three pages will be allowed for the final exam). Calculators are not to be used in the programmable mode on the exams.

Submission of Assignments

Homework and exams must be submitted via Canvas as pdf files.

Grading and Feedback

All Homework and exams will be graded within one week of the due date. The solutions will be posted on Canvas upon finalizing the grading.

Grades

Grades will be calculated based on the following two formulas, and the better grade will be considered. Note that there is a 5% extra credit when homework contribution is included.

	Formula 1	Formula 2
Homework	15%	0%
Exam 1	25%	30%
Exam 2	25%	30%
Final Exam	40%	40%

Extra Credit Opportunities

Participation in more than 50% of the help sessions during the period covered by each each midterm exam provides 3 extra credit points for that exam.

Participation in more than 50% of the weekly discussions in the discussion forum over the entire semester will provide 3 extra credits for the final exam.

Questions with assigned extra credits will be raised by the instructor during the synchronous help sessions.

Finding each mistake (excluding spelling and grammar) during the synchronous help sessions provides one extra credit to the person who finds it first.

Letter Grade

The letter grades will be assigned based on the overall grade distribution. However, the following ranges are guaranteed for different letter grades.

A	90-100%
B	80-89.9%
C	70-79.9%
D	60-69.9%

TECHNOLOGY REQUIREMENTS AND SKILLS

High-speed Internet connection for participation in synchronous help sessions

Laptop or desktop computer with reasonable speed and memory to enable participation in the synchronous help sessions (held using Zoom or TEAMS) and downloading/uploading the course materials and/or assignments.

A calculator to be used in the non-programming mode

Ability to use Adobe PDF software for reading the course materials and submitting the assignments

Technology Skills

Navigating a computer operating system; using Zoom for synchronous help sessions, launching and quitting applications; connecting to the Internet; using a web browser to search the World Wide Web; downloading, saving, and uploading files; and sending and replying to email.

Canvas

This class will use Canvas to deliver ALL course materials.

Technology Help Guidelines

30-Minute Rule: When you encounter struggles with technology, give yourself 30 minutes to 'figure it out.' If you cannot, then post a message to the discussion board; your peers may have suggestions to assist you. You are also directed to contact the Helpdesk 24/7.

When posting or sending email requesting help with technology issues, whether to the Helpdesk, message board, or me use the following guidelines:

- Include a descriptive title for the subject field that includes 1) the name of course 2) the issue. Do NOT just simply type “Help” into the subject field or leave it blank.
- List the steps or describe the circumstance that preceded the technical issue or error. Include the exact wording of the error message.
- When possible, always include a screenshot(s) demonstrating the technical issue or error message.

COURSE POLICIES, EXPECTATIONS, AND GUIDELINES

Communication Policy

- Email course questions and personal concerns, including exam grading questions, to me privately using ali.adibi@ece.gatech.edu. Do NOT submit posts of a personal nature to the discussion board.
- Email will be checked regularly. During the week, I will respond to all emails within 24 hours; on weekends and holidays, allow up to 48 hours. If there are special circumstances that will delay my response, I will make an announcement to the class.
- Virtual office hours and help sessions will be held using the Zoom. If needed, please feel free to request a one-on-one discussion using Zoom. I will set the time and will send you the link for the discussion.

Student Conduct and (N)etiquette

Communicating appropriately in the online classroom can be challenging. In order to minimize this challenge, it is important to remember several points of “*internet etiquette*” that will smooth communication for both students and instructors:

- Read first, Write later. Read the ENTIRE set of posts/comments on a discussion board before posting your reply, in order to prevent repeating commentary or asking questions that have already been answered.
- Avoid language that may come across as strong or offensive. Language can be easily misinterpreted in written electronic communication. Review email and discussion board posts BEFORE submitting. Humor and sarcasm may be easily misinterpreted by your reader(s). Try to be as matter-of-fact and professional as possible.
- Follow the language rules of the Internet. Do not write using all capital letters, because it will appear as shouting. Also, the use of emoticons can be helpful when used to convey nonverbal feelings.
- Consider the privacy of others. Ask permission prior to giving out a classmate's email address or other information.
- Keep attachments small. If it is necessary to send pictures, change the size to an acceptable 250kb or less (one free, web-based tool to try is picesize.com).
- No inappropriate material. Do not forward virus warnings, chain letters, jokes, etc. to classmates or instructors. The sharing of pornographic material is forbidden.

NOTE: The instructor reserves the right to remove posts that are not collegial in nature and/or do not meet the Online Student Conduct and Etiquette guidelines listed above.

University Use of Electronic Email

A university-assigned student email account is the official university means of communication with all students at Georgia Institute of Technology. Students are responsible for all information sent to them via their university-assigned email account. If a student chooses to forward information in their university email account, he or she is responsible for all information, including attachments, sent to any other email account. To stay current with university information, students are expected to check their official university email account and other electronic communications on a frequent and consistent basis. Recognizing that some communications may be time-critical, the university recommends that electronic communications be checked minimally twice a week.

Plagiarism and 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. All students enrolled at Georgia Tech, and all its campuses, are to perform their academic work according to standards set by faculty members, departments, schools, and colleges of the university; and cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing 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.

Copyright

The instructor provided course materials (prepared completely by the instructor may be shared). For all other materials, the students are advised to observe all relevant copyright rules.

"The Educators Guide to Copyright, Fair Use, and Creative Commons:"

- You cannot use everything you find on the Web
- There are resources you can use
 - Understanding Fair Use
 - What Can Be a Violation
- What is Creative Commons?
 - Look for a Creative Commons License
 - Finding Creative Commons Images
 - Creative Commons and Image Attribution
 - Adapting Creative Commons Images
- What are Free and Public Domain Images?
 - Attributing free to use and public domain images
 - Suggested free and public domain image Websites
 - Pixabay
 - Openclipart
 - Wikimedia Commons
 - The Commons
 - Getty Open Content Images
 - Getty Images
- Copyright and Videos
 - YouTube Copyright Basics
 - Curriculum and Text

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also email me as soon as possible in order to set up a time to discuss your learning needs.

Attendance and/or Participation

Students are expected to watch the assigned lecture videos each week. Participation in the help sessions is optional but highly encouraged as it provides problem-solving strategies as well as extra credit opportunities.

Collaboration and Group Work

Collaboration on homework problems is allowed and encouraged. However, each student must write the solution alone. Collaboration on the exams is not allowed.

Extensions, Late Assignments, and Re-Scheduled/Missed Exams

Late homework is accepted, but there will be a 20% penalty for each day. Extensions can be requested from the instructor; they may be granted under reasonable conditions assessed by the instructor.

Students are expected to participate in the exams at the assigned time period. Makeup exams are only arranged under special circumstances allowed by the institute regulations. Please communicate such situations clearly to me before the exam.

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. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation 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.

