ECE 3025 Syllabus

Electromagnetics ECE 3025, Section A, 3 Credits

Fall 2026

Instructor Information

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General Course Information

Description

Course covers electromagnetic fields and waves. Major topics include signals on transmission lines, electrostatic and magnetostatic fields, and uniform electromagnetic plane waves. These topics constitute the fundamental foundations for understanding the behavior of analog and digital electrical signals in electronics or communications at all frequency ranges.

Course Learning Outcomes

Calculate the propagation of currents and voltages on transmission lines with a variety of geometric configurations, sources and loads, for DC and transient signals.

Calculate the impedances of transmission lines with general loads, and use that information to determine input and load voltages and currents, for AC signals.

Analyze the connection between sources, materials, electrostatic fields, and energy storage and capacitance.

Analyze the connection between sources, magnetostatic fields, and energy storage and inductance.

Quantify the propagation of radio waves in free space and in simple media, lossless and lossy. "Quantify" implies being able to use some given parameters to determine others.

Model real-world networks, such as the electric distribution power grid, cable TV networks, the internet, and certain high-speed electronic circuits, by appropriate idealized transmission line systems.

Understand the relations between electric and magnetic fields and voltages and currents, and be able to explain non-ideal circuit behavior by reference to fields.

Calculate how electromagnetic waves enable, preclude, or limit, communications at certain data rates in various environments, radar systems at large distances, or remote sensing at various frequencies.

Required Course Materials

Peterson/Durgin, Transient Signals on Transmission Lines, 2nd Ed. (available through Canvas in pdf form or can be purchased in print form directly from Springer-Nature or via Amazon)

Also class notes in pdf form, available through Canvas.

Grading Policy:

Online Quizzes 10%; Homework 20%; Exams 45%; Final Exam 25%.

A>90; B>80; C>70; D>60

Assignments

- 10 Online Quizzes, 10%
- 10 Homeworks, 20%
- Exam 1, 15%
- Exam 2, 15%
- Exam 2, 15%
- Final Exam 25%

Description of Graded Components

There is a homework assignment for each of the major topics covered. All exams are closed-book with a provided formula sheet. Scientific calculators are permitted; graphing calculators and electronic devices capable of symbolic computation or communication are prohibited. Make-up exams require prior approval or documented emergency circumstances. The final exam is comprehensive, covering all course material.

Course Policies

Attendance and/or Participation

This will be an active classroom, where you will be expected to participate. I have noticed a drastic difference in the performance between students who regularly attend class and

participate compared to those who don't. Therefore, course attendance and participation is considered when determining your final grade.

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.

Core IMPACTS

This course does not count towards a Core IMPACTS area.

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.

Pre- &/or Co-Requisites

ECE 2040 [min C] Prerequisite.

Collaboration, Group Work, and Use of Generative AI

You are allowed to consult with other students on all homework assignments, but any work you turn in must be written in your own hand.

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

Late homework will be penalized accordingly. Homework extensions are given for illness, approved Institute activities or religious observances.