July 29, 2020

School of Electrical and Computer Engineering
Georgia Institute of Technology
ECE 3084-B: Signals and Systems
Fall 2020
Tue-Thu 3:30 pm - 4:45 pm, Van Leer C341

Prerequisite: ECE 2026 and ECE 2040.

Course Objective:

To investigate signals and systems via Fourier and Laplace transforms and linear system theory, and to explore their application to a wide variety of engineering problems.

Expectations associated with Hybrid Format:

- online lectures
- occasional in-person recitation-like meetings to discuss concepts from lectures
- final grades based on homework, quizzes, and final exam: attendance not a factor
- in-person meetings will be recorded and posted online for those unable to attend

Class Website: `http://barry.ece.gatech.edu/3084`

Official Text:

Signals and Systems, Chi-Tsong Chen, Oxford University Press, 2004, ISBN 0195156617.

Recommended Reading:

Signals and Systems for All Electrical Engineers, Lanterman, Michaels, and Egerstedt; notes posted on class website.

Signal Processing First, McClellan, Schafer, and Yoder, especially chapters 9 – 12.

Fundamentals of Signals and Systems, Third Edition, Kamen and Heck, Prentice Hall, 2006, ISBN 0131687379.

ECE 3084 resource page, `http://ece3084.ece.gatech.edu`

MIT Signals and Systems Course,
`http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/`

Instructor:

John R. Barry
Office Hours: after lecture, or by appointment

Honor Code:

You are expected to uphold the honor code (http://www.honor.gatech.edu).
Violations will be reported.

HOMEWORK:

Approximately 10 homework sets.

GRADING:	Homework	20%
	Quiz 1 (Thu Oct 1)	25%
	Quiz 2 (Thu Nov 12)	25%
	Final Exam (date TBA, week of Dec 1-8)	30%

TENTATIVE LIST OF TOPICS

The subject of this class provides the foundation for mathematical representations and abstractions for analysis and design of pretty much everything — from electrical circuits to self-driving cars.

- Signals
- Systems
- System properties: Linearity, Time-Invariance, Causality
- LTI and Convolution
- Correlation and Matched Filtering
- Frequency Response
- Fourier Series
- Fourier Transform
- Modulation
- Baseband Signal Representation
- Solving Differential Equations via Laplace
- Partial Fraction Expansion
- Laplace Analysis of Circuits
- Transfer Functions: Poles, Zeros, and Stability
- Step and Frequency Responses: 1st and 2nd Order Systems
- Relationship Between Laplace and Z Transforms
- Filter Design and Implementation
- Feedback Control
- Control Systems: Analysis and Design