ECE 4445
Audio Engineering
Fall 2026

Catalog Description Concepts of acoustics and electroacoustic modeling for the analysis and design of microphones, loudspeakers, and crossover networks.

Course Outcomes Upon successful completion of this course, students should be able to

1. create and use electromechanical and electroacoustic models to solve for variables in mechanical and acoustic systems.
2. relate model parameters to system behavior.
3. characterize and model moving coil loudspeakers.
4. design infinite baffle, closed box, and vented box loudspeaker systems.

Required Textbook W. Marshall Leach, Jr., *Introduction to Electroacoustics and Audio Amplifier Design*, 4th Edition, Kendall/Hunt

Grading The course grade will be based on biweekly quizzes, homework, a design project, and a final examination. These will count toward the grade as follows:

Quizzes:	50%
Homework:	10%
Design Project:	10%
Final Exam:	30%

Attendance You are expected to attend all course meetings. Any class absence that would result in a missed assignment must be approved by the instructor in advance.

Course Topics

1. Basic Principles of Sound
2. Fundamentals of Acoustics
3. Analogous Circuits of Acoustical Systems
4. Analogous Circuits of Mechanical Systems
5. Microphones
6. Moving-Coil Loudspeakers
7. Closed-Box Loudspeaker Systems
8. Vented-Box Loudspeaker Systems
9. Crossover Networks
10. Acoustic Horns
11. Audio Power Amplifiers

Homework Format On the first page of the submitted assignment include the course number, your printed name, the date, the assignment number, and the problems assigned. A cover sheet is not necessary– this information may be at the top of the first page of the assignment. Number each problem by writing both the chapter number and the problem number. Do not write the problem numbers where they will be covered by a staple. Draw a line between problems and draw a box around the final answer. How your solution was obtained must be justified by showing intermediate steps and numerical results in your solutions. For non-numerical solutions, explain your reasoning in detail to receive credit for the problem.

Homework Collaboration Homework is to be completed individually. You are allowed and encouraged to ask me and the class GTA questions, although you should try to think about the problems before asking. You may discuss the problems with other members of the class, but the solutions are to be your own. Neither I nor the GTA will work problems for you if you do not submit evidence that you have made a prior attempt to work it. You are strongly encouraged to work extra problems and example problems from the book on your own.

Quizzes Quizzes are given every other week on Friday. The quizzes will be given during the first 20-30 minutes of class and will primarily cover the previous two weeks of material.

Use of Old Quizzes Use of course materials from a previous semester as a study aid is allowed. While this material may provide examples for you, it is not necessarily representative of tests, quizzes, homework, projects, or any other course work that may be assigned during this semester.

Design Project The project is a multi-part project with the final part due during the final instructional class days. On the design project, two students may work together and submit a single report. In special circumstances, three students will be allowed to work together and submit a single report.

Final Exam The final exam is a comprehensive written exam given during the scheduled exam period.

Classroom Decorum Please be considerate of the other students in the class. Arrive for class and be seated before the bell. If you must enter or leave the classroom during the lecture, do not let the door slam. Do not talk in class. Turn your cell phones off before class begins. Do not use a cell phone in class. School policies prohibit the consumption of food and beverages in the classroom.

Academic Honor Code Issues 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 (https://catalog.gatech.edu/policies/honor-code/) and the student Code of Conduct (https://catalog.gatech.edu/rules/18/). 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. Plagiarizing is defined by Webster's dictionary as to steal and pass off the ideas or words of another as one's own, to use another's production without crediting the source, to commit literary theft, to present as new and original an idea or product derived from an existing source.

Student-Faculty Expectations Agreement At Georgia Tech, it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See https://catalog.gatech.edu/rules/22/ for an articulation of some basic expectations that you can have of me and that I can have of you. Respect for knowledge, hard work, and cordial interactions will help achieve this atmosphere. You are encouraged to remain committed to the ideals of Georgia Tech while in this class.

Accomodations 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 e-mail me as soon as possible in order to set up a time to discuss your learning needs.