

# **ECE4446 Course Syllabus**

## **ECE4446**

### **Audio Engineering Laboratory (0-0-3-1)**

#### **CMPE Degree**

This course is Elective for the CMPE degree.

#### **EE Degree**

This course is Elective for the EE degree.

#### **Lab Hours**

3 supervised lab hours and 0 unsupervised lab hours

#### **Course Coordinator**

Robinson Jr, Robert Allen

#### **Prerequisites**

ECE 4445\* \* Prerequisites indicated with an asterisk may be taken concurrently with ECE4446

#### **Corequisites**

None

#### **Catalog Description**

A companion laboratory to ECE 4445. Design, analysis, construction, modeling, and testing of circuits and systems pertaining to audio engineering.

#### **Textbook(s)**

No Textbook Specified.

#### **Course Outcomes**

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

1. design and implement circuits and systems related to sound generation and modification.
2. develop evaluation methods for these circuits and systems and interpret the resulting data.
3. write laboratory reports and documentation conforming to technical writing standards.
4. identify components of a complex impedance from measured data.
5. determine equivalent circuit models for various acoustical, mechanical, and electrical systems from measured data.
6. use circuit models to make predictions about systems containing the modeled components.
7. use laboratory instrumentation to measure data generated by various structures/ systems/circuits.
8. relate time domain, frequency domain, and audible characteristics of signals.
9. identify non-ideal characteristics of passive circuit elements.

#### **Student Outcomes**

In the parentheses for each Student Outcome:

"P" for primary indicates the outcome is a major focus of the entire course.

“M” for moderate indicates the outcome is the focus of at least one component of the course, but not majority of course material.

“LN” for “little to none” indicates that the course does not contribute significantly to this outcome.

1. ( P ) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. ( LN ) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. ( P ) An ability to communicate effectively with a range of audiences
4. ( LN ) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. ( M ) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. ( P ) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. ( P ) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### **Topical Outline**

Time, frequency, and audible characteristics of fundamental signals

Derivation of circuit model of unknown impedance from measured data.

The plane wave tube. Acoustic input impedance measurement. Derivation of

Modeling a mechanical system as an electrical circuit. Derivation of

Loudspeaker cabinets. Characteristics of different cabinets. Helmholtz

Analog circuits for sound manipulation and generation. Speech scrambling

Crossover networks. Design and measurement. Driver interaction. Phase

Audio power amplifier fundamentals. VBE multiplier, push-pull output