

University of Miami Frost School of Music
Fall 2005

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| <p style="text-align: center;">MMI 401 Audio Electronics</p> |
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3 Credit Hours
Section R
T R 2:00–3:15
MSL 130 and Gusman Studio

Professor Colby Leider
Weeks 109
Office Hours: T 10–12, F 1:30–3 and by appointment
cleider@miami.edu

Course Description

MMI 401 presents practical topics in audio electronics ranging from basic DC and AC electrical circuits to audio cables, operational amplifiers, and the design and construction of simple audio amplifiers and filters. We will address pragmatic design issues of audio systems as well, including soldering, assembly, hardware, components, and project enclosures. You will be required to purchase parts occasionally on the Internet or locally from Radio Shack, and the cost should not exceed \$10 per person. Students will gain hands-on experience in wiring and assembling a professional studio through assisting in the renovation of the Gusman Studio and making music there.

Prerequisites

MMI 201.

Course Objectives

Students will master Kirchhoff's Laws, Thevenin's Theorem, Ohm's Law, basic amplifiers, and operational amplifier circuits, as well as practical concepts behind audio cables, connectors, and analog amplifiers and filters. At the conclusion of the course, you should be ready to begin designing and building your own audio circuits for use in the studio.

Instructional Methodology

Class meetings will normally consist of a lecture; occasional pop quizzes will be given as well. You will occasionally present material to the class yourself and practice public speaking skills. Read the book chapter we will be discussing before class, and bring any questions you may have. We will arrange a time to meet outside of class in the Gusman studio for you to work on audio projects as they are assigned.

Required Text

Scherz, P. 2000. *Practical Electronics for Inventors*. New York: McGraw-Hill.

Examinations

Occasional pop quizzes will be given during class, as well as a midterm and a final.

Grading Policy

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| Attendance and Participation | 10% |
| Quizzes | 10% |
| Homework | 10% |
| Midterm 1 | 25% |
| Midterm 2 | 25% |
| Final Paper | 20% |

Class Schedule

Lecture 1 (Thursday, August 24)

Course Introduction
Analog and Digital Systems
Why Analog?
Reading: Chapter 1

Lecture 2 (T Aug 29)

Introduction to Electronics Theory
Current, Voltage, Resistance
Reading: Chapter 2

Lecture 3 (R Aug 31)

Simple DC Circuits
Ohm's Law
Voltage and Current Division

Lecture 4 (T Sep 5)

Equivalent Circuits
Kirchhoff's Laws

Lecture 5 (R Sep 7)

Simple AC Circuits
Inductors and Capacitors
Impedance

Lecture 6 (T Sep 12)

Review of Imaginary Numbers
RC/RL/RLC Circuits
Circuits with Sinusoidal Sources

Lecture 7 (R Sep 14)

AC Circuit Analysis: The Hard Way and The Easy Way

Lecture 8 (T Sep 19)

Passive Audio Filters
Crossovers
Resonance

Lecture 9 (R Sep 21)

Class Presentations of Basic Circuit Components
Wires, Cables, Connectors, Batteries, Switches, Relays, Resistors,
Capacitors, Inductors, Transformers, Fuses and Circuit Breakers
Reading: Chapter 3

Lecture 10 (T Sep 26)

Class Presentations of Basic Circuit Components, continued

Lecture 11 (R Sep 28)

Introduction to Semiconductors
Diodes
Transistors
Reading: Chapter 4

Lecture 12 (T Oct 3)

Optoelectronics
Integrated Circuits
Reading: Chapters 5, 6

Lecture 13 (R Oct 5)

Introduction to Op-Amps
Reading: Chapter 7

Lecture 14 (T Oct 10)

Review

Lecture 15 (R Oct 12)

Midterm Exam 1
The Midterm will cover material from Chapters 1–6 and course lectures.

Lecture 16 (T Oct 17)

More on Op-Amps

Lecture 17 (R Oct 19)

Designing Passive Analog Filters
Reading: Chapter 8

Lecture 18 (T Oct 24)

Designing Passive Active Analog Filters
Integrated Circuit Filters

Lecture 19 (R Oct 26)

Audio Oscillators
Reading: Chapter 9

Lecture 20 (T Oct 31)
Voltage Regulators
Power Supplies
Reading: Chapter 10

Lecture 21 (R Nov 2)
Electronics behind Microphones and Loudspeakers
Audio Preamps and Amps
Reading: Chapter 11

Lecture 22 (T Nov 7)
Impedance Matching
Mixers
Panners

Lecture 23 (R Nov 9)
Hands-On Electronics
Project Enclosures
Sensors and Actuators
Reading: Chapters 13, 14

Lecture 24 (T Nov 14)
Review

Lecture 25 (R Nov 16)
Midterm Exam 2
Midterm Exam 2 will cover material from Chapters 7–11 and course lectures.

Lecture 26 (T Nov 21)
Work on Final Papers

Thanksgiving Break (R Nov 23)

Lecture 27 (T Nov 28)
Final Paper Presentations

Lecture 28 (R Nov 30)
Final Paper Presentations

Attendance Policy

You must attend class. This accounts for 10% of your final grade, and no make-up quizzes will be given for any reason.

Honor Code

Students will be bound by the University of Miami Honor Code. All reports, papers, written assignments, test papers, and examination papers must include a signed honor pledge that states: "On my honor, I have neither given nor received any aid on this assignment." Academic dishonesty may result in a lower grade or a failing grade for the entire course.

Disabilities

Any student with a documented disability (e.g., physical, learning, psychiatric, visual, aural, etc.) who needs to arrange reasonable accommodations must contact the instructor and Disability Services at the beginning of the semester.

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