

Ver 3.0 (6/21/2017)

Florida Atlantic University
Department of Computer and Electrical Engineering and Computer Science
Engineering Scholars Program (ESP)

EEL 1007C Electronic Design with Operational Amplifiers (3 credits)
Summer 2018

1. Course Description and Prerequisites

This is a hands-on electronics circuit design course using standard electronic components and common electronic lab instruments. No prior background in electromagnetism is assumed. The theoretical material and the design methods are covered through interactive PSPICE software simulation sessions and lectures. The course lab experiments culminate in a design project competition of a wireless optical communication system.

Prerequisites: Knowledge of Math and Physics- Permission of instructor.

2. Course Objectives

The course covers the fundamentals of electrical circuits and electronics via traditional-setting lectures coupled with computer lab simulations coupled with electronics lab experimentation. For enhanced breadth and depth of coverage every electronics principle and fact covered in this course will be presented from the above three angles (which do complement one another). Students spend half of their class time in the lab conducting guided experiments. The other half of class time is divided between lectures and computer lab activities. Due to the special time format constraints (9 full class days spread over three weeks) the course is fast paced and homework-intensive (team lab technical reports and individual computer lab assignments).

3. Course Outcomes

- a) The students develop deep understanding of the operation principles and key properties of some of the most fundamental electrical and electronic building blocks – resistors, capacitors, op-amps, diodes and BJT transistors,
- b) Students become familiar with basic electronics lab instruments – power supplies, signal generators and oscilloscopes,

- c) Students learn how to use an industry-grade electronic circuits simulator and how to integrate this tool with the theory provided via lectures and experimentation done in the lab,
- d) Students form lab teams and learn how to collect experimental data and how to process it and present it in technical reports,
- e) Students become exposed to open-ended electronics design-oriented tasks.

4. Reference Book (optional)

J.R. Cogdell, "Foundations of Electronics", Prentice Hall 1999.

5. Resources

- a) All notes (computer lab and electronics lab manuals) and class related announcements will be posted on the course's web page (<http://blackboard.fau.edu>). Students should download and bring to class either the electronic or printed latest versions of the lab and computer lab manuals at the appropriate dates shown in this syllabus.
- b) Electronic parts and tools kit and textbook vouchers for the Book-Smart store (located in Oaks Plaza on Glades Road right across from the FAU campus) will be distributed on the first day of classes. Orcad Lite 16.6 may be downloaded from the Cadence web site.

5. Instructor and Contact Information

Dr. Ali Zilouchian Dean's Office (3rd Floor- EE)297-0432
zilouchi@fau.edu

Teaching Assistants:

- 1) Juan Teyssandier jteyssan@fau.edu
- 2) TBA

8. Class Dates, Time and Location

Meeting Places and Times: TBA

Lab: Engineering East Building, Room 210 (EE 210)
Computer Lab: TBA
Lecture: TBA

6. Course Schedule Details

Monday, June 11

9:30 – 9:45	Orientation	Engineering East (EE) Bldg. 96 – The Cube (101)
10:00-11:25	Lecture	Complex numbers & applications to RC circuits

11:30-12:30	Computer Lab	Circuits analysis using PSPICE
12:30-1:30	Lunch	
1:30-4:30	Lab	Orientation; Lab kits distribution; Instruments familiarization; DC electrical networks; AC and pulse signals; Capacitors and RC circuits – measurement of a RC network frequency response

Wednesday, June 13

9:30-11:00	Lecture	Op-Amp basic circuits
11:00-12:30	Computer Lab	Op-amp amplifiers and comparators
12:30-1:30	Lunch	
1:30: 4:30	Lab	Op-amps and Comparators

Friday, June 15

9:30-11:00	Lecture	Op-Amp Applications
11:00-12:30	Computer Lab	Level Shifting; Differential Amplifiers
12:30-1:30	Lunch	
1:30-4:30	Lab	Level Shifting and Band-Pass Filter analysis

Monday, June 18

9:30-11:25	Lecture	Introduction to Diodes
11:30-12:30	Computer Lab	Basic Diode and Transistor circuits
12:30-1:30	Lunch	
1:30-4:30	Lab	Diode characteristics; Transistor characteristics

Wednesday, June 20

9:30-11:00	Lecture	Transistor circuits & Power Amplifier
11:00-12:30	Computer Lab	Power Amplifiers
12:30-1:30	Lunch	
9:30-12:30	Lab	Power Amplifiers

Friday, June 22

9:30-11:25	Lecture	Review, timer 555 and Quiz #1
11:30-12:30	Computer Lab	555 Timer and Applications
12:30-1:30	Lunch	
1:30-4:30	Lab	Timer 555 (Astable Multivibrator)

Monday, June 25

9:30-11:25	Lecture	AM Communication
11:30-12:30	Computer Lab	AM Transmitters and Receivers
12:30-1:30	Lunch	
1:30-4:30	Lab.	Amplitude Modulated Optical Transmitter

Wednesday, June 27

9:30-12:30	Lecture	Review, Quiz #2 and AM Radio Project
12:30-1:30	Lunch	
1:30-4:30	Lab	AM Radio Project

Friday, June 29

9:30 -11:00	Computer Lab	Final Project Simulation
11:00- 12:30	Lab	Final Project Experiment
12:30-1:30	Lunch	
1:30-3:30	Lab	Project Demonstration and soldering
3:30-4:30	Lab	Course wrap-up

7. Submission and Lab Usage Requirements

- 1) Lab reports, on whatever a team accomplishes in every lab session, are due the morning of the next class day. Each team submits one brief report per experiment. Teams must include the measured data and answers to those questions that are posed in bold letters in the lab instructions.
- 2) The computer homework assignments are also due the morning of the next class. Each student should submit individual report. Each report should be brief and include only answers to the questions posed, circuit diagrams and the relevant simulation results annotated.
- 3) Lab reports are no longer required to be submitted in a technical report format.
- 4) The Lab Participation and Work Quality grade will be based on the Instructors' impression of each team member's contribution to the lab experiments efforts. Students who consistently let their lab partners do most of the work may lose the entire 7% grade in this category. Students are expected to be active participants.

For further information: Registered students should use their FAU ID to access the course's canvas web page: <https://canvas.fau.edu/login/canvas>