ECE 3111 Electronics

COURSE DESCRIPTION

This course will cover the basics of the analog integrated circuits using Bipolar and MOS technologies. The following topics will be emphasized: Bipolar and MOS transistor models; single stage and two stage amplifiers; emitter coupled pairs, source coupled pairs, operational amplifiers; amplifier theory and design.

A. Textbook


B. Exams and Grading Weights

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<tr>
<th></th>
<th>%</th>
<th>Due</th>
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<tbody>
<tr>
<td>Professionalism*</td>
<td>10%</td>
<td>Daily</td>
</tr>
<tr>
<td>Exam 1</td>
<td>20%</td>
<td>Week 7</td>
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<tr>
<td>Exam 2</td>
<td>30%</td>
<td>Week 12</td>
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<tr>
<td>Final</td>
<td>40%</td>
<td>See online schedule</td>
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<tr>
<td>Lab**</td>
<td>Pass or Fail</td>
<td>Weekly</td>
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*How you present yourself is very important whether it is how you present your labs, address your professor, your GSA, or your peers. Be respectful. Your professor and your GSA are your evaluators. You are paying to be formally evaluated.

**If you fail the lab you fail the class (all labs with documented excuses must be made up with permission of GSA).

C. Office Hours (subject to change)

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<tr>
<td>Dr Earles</td>
<td>WRF</td>
<td>9-11am (See schedule posted by door.)</td>
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<tr>
<td>Mano</td>
<td>TBA</td>
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Email for an appointment outside of those times or meet with GSA. The subject of your email must include “ECE3111” in the subject. Do not expect an immediate response to your email. Emails will be read during normal office hours.

Professor:  Dr Susan Earles  352EC  earles@fit.edu
GSA:       Mano Pakalapati  Lab  mpakalapati2010@fit.edu
D. Course Outline (weeks subject to change)

Weeks 1-2: Circuit review, filters, and introduction to electronics – Chapter 1
Weeks 3-6: MOS transistors (MOSFETs) – Chapter 4
  Small signal models and single-stage amplifiers – Chapter 13
    Review and Exam 1
Weeks 7-10: Bipolar transistors (BJTs), dc and small-signal models – Chapter 5
  Single-transistor and multistage amplifiers – Chapter 14
Weeks 11-12: Review and Exam 2, Diodes
Weeks 13-14: Operational amplifiers (OpAmps) – Chapter 11
Weeks 15-16: Review

E. Labs

This is a tentative schedule. The labs will follow topics covered in lectures.

Week 2-3: Lab Procedure and Lab Safety, RC and RLC filters
  An Introduction to PSPICE
Weeks 4-6: MOSFETs
Weeks 7-9: BJTs
Week 10-12: Amplifiers and diodes
Weeks 13-14: OpAmps

F. Course Objectives

At the completion of the course, the students should be able to perform the following:
  a. Identify the operating regions of MOSFETs.
  b. Calculate the FET current-voltage relationship in the saturated, triode, and cut-off states.
  c. Analyze and solve circuits where the FET state is not known.
  d. Develop small-signal models of the FET and FET amplifiers.
  e. Develop SPICE simulation of the FET and FET circuits.
  f. Utilize large signal BJT models for the cut-off, active, and saturated modes.
  g. Analyze and solve circuits where the BJT state is not known.
  h. Analyze and design a stable operating point for a single-stage BJT amplifier.
  i. Develop small-signal models of the BJT and design a single-stage BJT amplifier to specifications.
  j. Develop SPICE simulation of the BJT and BJT circuits.
  k. Analyze and solve circuits involving OpAmps.