ECE 3111 Electronics  (Revised)

COURSE DESCRIPTION

This course will cover the basics of the analog integrated circuits using Bipolar, 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, temperature and supply independent biasing; operational amplifiers; frequency response, feedback concepts, feedback amplifier theory and design.

A. Textbook


B. Exams and Grading Weights (Tentative)

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<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Home Work</td>
<td>15%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Lab</td>
<td>20%</td>
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<tr>
<td>Midterm</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>30%</td>
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C. Office Hours (subject to change)

M 10:30am - 12pm
T 2pm – 4pm

Email for an appointment outside of those times or meet with GSA.

Instructor: Dr Susan Earles 352EC earles@fit.edu
GSA: Jean-Michel Tschann Lab jtschann@fit.edu

D. Course Outline (Tentative)
(I recommend you read the entire chapter. The sections given will be emphasized.)

1. Basics/Background
   Diodes and Operational Amplifiers Basics
   2.1.1 - 2.1.3

   Frequency response
   1.6.1 – 1.6.5, Appendix E

2. MOSFETs
   Amplifier Circuits
   4.1.1 - 4.1.9, 4.2.1 - 4.2.8
Basic MOS subcircuits/single transistor, biasing
4.3, 4.4.1 - 4.4.6, 4.5.1 - 4.5.5, 4.6-4.6.6, 4.7.1 - 4.7.7

Basic MOS single stage architecture/analysis
6.3.1 – 6.3.2, 6.5.1 – 6.5.2, 6.7.1 – 6.7.3, 6.9.1, 6.10.1

MOS single-stage differential amplifier
7.1.1 - 7.1.3, 7.2.1 - 7.2.2

(Midterm will cover through this material)

3. BJTs
Biploar and MOS Integrated-Circuit technology (review)
5.1.1

Models for BJT
5.1.2 - 5.1.5

BJT Single-Transistor
5.2.1 - 5.2.6, 5.3.1 - 5.3.4, 5.4, 5.5.1 - 5.5.4, 5.6.1 - 5.6.11, 5.7.1 - 5.7.7, 6.8.2, 6.9.2

Two-Transistor Amplifiers
7.3.1 - 7.3.3, 7.4.2 - 7.4.5

Transistor Current Sources and Active Load
6.3.3, 6.12.2-6.12.5, 7.5.5

4. MOS/BJT Multistage Transistor/Amplifier
7.5.1 - 7.5.4, 7.6.1 - 7.6.2, 7.7.1 - 7.7.2, 7.8

5. BJT Operational Amplifiers (*1)
9.3.1 - 9.3.6, 9.4.1 - 9.4.8, 9.5.1 - 9.5.3, 9.6.1 - 9.6.5

6. MOS two-stage/Folded-Cascode operational amplifier analysis and design
9.1.1 - 9.1.5, 9.2.1 - 9.2.7

7. MOS Frequency response
4.8.1 – 4.8.5, 4.9.1 – 4.9.4, 6.4.1 – 6.4.4, 6.6.1 – 6.6.5,
6.8.1 – 6.8.2, 6.9.1-6.9.2, 6.10.1 – 6.10.2, 7.6.1 – 7.6.2

6. Frequency Response of Integrated Circuits
4.9.3, 5.9.3, 6.4.1 – 6.4.4, 6.6.1 – 6.6.5, 6.8.3 – 6.8.6, 6.10.3, 6.11.1-6.11.3
9.6.1 – 9.6.5

7. Feedback (Sections of Ch 8 as time allows.)