Analog Electronics - Course Syllabus

Course Number: EE 102

Course Title: Analog Electronics

Academic Semester: Fall  Academic Year: 2016/2017
Semester Start Date: Aug. 21, 2016  Semester End Date: Dec. 15, 2016

Class Schedule: TBD

Instructor(s) Name(s): Prof. Talal Al-Attar
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Office Location: Bldg:9 Level:3 Office: 3350

COURSE DESCRIPTION FROM PROGRAM GUIDE

This course covers the design, construction, and debugging of analog electronic circuits. The main contents are: the basic principles of operation, terminal characteristics, and equivalent circuit models for diodes, transistors, and op-amps. Design and analysis of multistage analog amplifiers. Study of differential amplifiers, current mirrors, and gain stages. Frequency response of cascaded amplifiers and gain-bandwidth considerations. Concepts of feedback, stability and frequency compensation. Includes weekly laboratory.

COMPREHENSIVE COURSE DESCRIPTION

This Course consists of two parts:

Part 1:

Introduces the fundamentals of the lumped circuit abstraction. Topics covered include: resistive elements and networks, independent and dependent sources, switches and MOS transistors, digital abstraction, amplifiers, energy storage elements, dynamics of first and second order networks, design in the time and frequency domains, and applications of analog and digital circuits.
Part 2:

Covers the design, construction, and debugging of analog electronic circuits.

The main contents are: the basic principles of operation, terminal characteristics, and equivalent circuit models for diodes, transistors, and op-amps. Introduction to multistage analog amplifiers, differential amplifiers, current mirrors, and gain stages including frequency response of cascaded amplifiers and gain-bandwidth considerations.

Design and lab exercises are significant components of the course.

GOALS AND OBJECTIVES

After completing this course, the student should have a firm grasp on:

Part 1:

• The use of Kirchhoff’s laws and Ohm’s law
• The use of circuit analysis techniques (Node-Voltage & Mesh-Current methods)
• The concepts and types of amplifiers
• The electric behavior of Inductors & Capacitors (Time & Frequency domains)
• The concepts of Sinusoidal steady-state analysis and the calculations of Power types
• The difference between Analog and Digital design and applications
• The concepts, the use and the analysis of MOS transistors in different circuits and applications

Part 2:

• The concepts, the models, the use and the analysis of MOS transistors in different circuits and applications
• The concepts, the models, the use and the analysis of BJT transistors in different circuits and applications
• The concepts, the models, the use and the analysis of single stage and two stage op-amps in different circuits and applications

REQUIRED KNOWLEDGE

Familiarity with basic circuit knowledge

REFERENCE TEXTS

Electric Circuits, 10th edition
Nilsson & Riedel

Microelectronic Circuits, 6th edition
Sedra & Smith
METHOD OF EVALUATION

<table>
<thead>
<tr>
<th>Graded content</th>
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</thead>
<tbody>
<tr>
<td>Lab/Sims 20% (Attendance, Quizzes &amp; Reports)</td>
</tr>
<tr>
<td>Homeworks 10%</td>
</tr>
<tr>
<td>Quizzes 15%</td>
</tr>
<tr>
<td>Project/Presentation 10%</td>
</tr>
<tr>
<td>Midterms 25% (12.5% Two Exams)</td>
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<tr>
<td>Final 20%</td>
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COURSE REQUIREMENTS

Assignments

Homework:
Homework assignments are due on Thursday in the class. The Solutions will be provided by the end of the day homeworks are due. If you need more time for your homework, you have to inform the Instructor or the TA in advance.

Quizzes:
There will be at least one Quiz every week starting the 2nd week and will be based on a 0-10 point scale. The worst few quizzes will be dropped (if any). If you are keeping up with the problem sets, they should be relatively easy.

Exams:
There will be two midterm exams and one final exam. You are free to use your text book, course notes and any provided figures and handouts.

Course Policies

All homework assignments, quizzes, and exams are required. Students who do not show up for a Quiz or an exam should expect a grade of zero on that exam.
If you dispute your grade on any homework, quiz, or exam, you may request a re-grade (from the TA for the homeworks and quizzes or from the instructor for the exams) only within 48 hours of receiving the graded exam.
Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable. The assignment of an (I) requires first an approval of the dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements.
**Additional Information**

Engineers are required to practice “continuous” or “life-long” learning. This course will cover a lot of material which will require the students to do a lot of self-study, reading of the textbooks and handouts, learning how to use equipment and software, etc. Although the instructor and the TAs are committed to help the students in this course, the students are also expected to take initiatives and to get used to this notion of self-study that will be anyway (i) expected form them in their future careers and (ii) imperative to their success and survival in the real engineering and academic worlds.

Please don’t hesitate to ask if you have any question or concern about the course.

**NOTE**
The instructor reserves the right to make changes to this syllabus as necessary.