

University of Michigan
EECS 522: Analog Integrated Circuits
Winter 2009

General Information

LECTURER

Prof. David Wentzloff, Room 2417A, 647-4499, wentzlof@umich.edu

WEBSITE

<http://www.eecs.umich.edu/courses/eecs522/w09/>

COURSE DESCRIPTION

This course requires EECS 413, Monolithic Amplifier Circuits, or an equivalent knowledge of small signal analysis, frequency response, feedback, CMOS and BJT circuit design. The course is comprised of lectures, discussions, exams, individual design projects, and a team project. It is divided into three sections:

1. Analog summary and overview of radio architecture, noise, distortion, oscillators, LNAs and mixers, and voltage references and biasing.
2. Review and study of integrated circuit fabrication technologies and BJT and MOS transistor models.
3. Detailed analysis and design of analog integrated circuits including power amplifiers, voltage references, voltage regulators, rectifiers, oscillators, multipliers, mixers, phase detectors and phase-locked loops.

Students will learn to understand the operating principles and design concepts for a number of important RF IC building blocks including RF amplifiers, oscillators, mixers, and references. They will implement individual design projects in a current CMOS process. The course also includes an open-ended team project for which groups will research a relevant topic of their choosing and design a solution including layout of RF components. Groups will give presentations of their results to the class.

PREREQUISITES

EECS 413 or an equivalent course is required.

OFFICE HOURS

Wentzloff MW 1:30-2:30PM, EECS 2417A
Additional hours available by request

TEXT BOOKS

Semi-complete handouts will be given for all lecture material. The notes will be fairly comprehensive but I recommend you also get the Tom Lee textbook on which the course is based.

Recommended: The Design of CMOS Radio-Frequency Integrated Circuits (2nd Edition)
 T. Lee
 Cambridge University Press, 2003
 ISBN: 0521835399

The following text books are not required, but may be useful for reference.

Also useful: Analysis and Design of Analog Integrated Circuits (4th Edition)
 P. Gray, P. Hurst, S. Lewis, and R. Meyer
 Wiley, 2001
 ISBN: 0471321680

 Analog Integrated Circuit Design
 D. Johns and K. Martin
 Wiley, 1996
 ISBN: 0471144487

GRADING POLICY

The same late policy will apply to homework, CAD assignments, and project reports. Late assignments will be penalized 20% per day late. Assignments due in lecture that are turned in after lecture on the date they are due are considered one day late.

Problem sets should be handed in at the beginning of class on the date they are due. Students are required to do the assignment and turn in their own work; however, you are encouraged to discuss problem sets with other students.

CAD assignments should be handed in at the beginning of class on the date they are due. Each student is required to work independently to generate their own schematics and perform the requested simulations. Feel free to ask for help from other students.

The quiz and final exam will include material covered in lecture, as well as material that appears in the problem sets and CAD assignments. Information on the exam times and locations, as well as the material covered will be given in lecture.

The final project is a major design project involving circuit design, behavioral modeling, layout, and simulation. The topic is open-ended, and students are encouraged to choose a project that relates to their own research. Students are expected to work in teams of three people. One final report per team in the form of a journal paper will be submitted. Teams will also give oral presentations of their designs during lecture.

Homework	7%
CAD Assignments	10%
Quiz 1	25%
Final Exam	25%
Final Project	33%

HONOR CODE

<http://www.engin.umich.edu/students/honorcode/code/index.html>

The Code

The Honor Code outlines certain standards of ethical conduct for persons associated with the College of Engineering at the University of Michigan. The policies of the Honor Code apply to graduate and undergraduate students, faculty members, and administrators. The Honor Code is based on these tenets:

- Engineers must possess personal integrity both as students and as professionals. They must be honorable people to ensure safety, health, fairness, and the proper use of available resources in their undertakings.
- Students in the College of Engineering community are honorable and trustworthy persons.
- The students, faculty members, and administrators of the College of Engineering trust each other to uphold the principles of the Honor Code. They are jointly responsible for precautions against violations of its policies.
- It is dishonorable for students to receive credit for work that is not the result of their own efforts.

"I have neither given nor received unauthorized aid on this examination, nor have I concealed any violations of the Honor Code."

Instructors are not required to grade tests in which the signed Honor Pledge does not appear. The Honor Code remains enforced whether or not the student signs the Pledge.

ACCOUNT SETUP

Obtain a CAEN account if you don't already have one

<http://www.engin.umich.edu/caen/accounts/access.html>

Sign the CAD usage agreement

Download the CAD tutorials from the course website and perform the account setup. No tutorial sessions will be offered. Students are expected to work through the tutorials.