

## EE 414/514/510 – MICROWAVE ENGINEERING

IOWA STATE UNIVERSITY DEPT. OF ELECTRICAL AND COMPUTER ENGINEERING

Unless otherwise noted, everything in this syllabus applies to both EE 414, EE 514, and the distance education class EE 510.

**Required Text:** Michael Steer, Microwave and RF Design: A Systems Approach

**Optional Text:** David M. Pozar, Microwave Engineering, 3<sup>rd</sup> Ed.

Robert J. Weber, Introduction to Microwave Circuits: Radio Frequency and Design Applications

### **Instructor:**

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Office: 2132 Coover Hall  
Office Hours: **TBD**

### **Teaching Assistant:**

**TBD**

**Prerequisites:** ECE 230 and ECE 311 (If you are unsure if you meet the prerequisite requirements, or would like to take the course despite not meeting the requirements, please see the professor to discuss your situation.)

### **Course Description**

This class will focus on the principles, analyses, and instrumentation used in designing circuits that operate in the microwave portion of the electromagnetic spectrum. We will discuss component modeling, S-parameters, microwave amplifiers, oscillators, and filters including optimum noise figure and maximum power designs.

### **Lectures**

Incomplete lecture notes will be posted the day before the lecture is to be given, or sooner. It is the responsibility of each student to print out the lecture notes and bring them to class to fill in the missing details. Complete lectures will not be posted by the instructor.

### **Homework**

Weekly homework assignments will be assigned on Monday and will be due following Monday by 5:00pm in the instructor's office, unless otherwise noted. While it is encouraged to collaborate with other students, direct copying is not permitted and each student must turn in his or her own complete assignment.

Students enrolled in EE 510 are expected to submit homework solutions on the Monday after the homework is assigned by midnight Central Daylight Time. Homework can be submitted in one of two ways: 1) Scan a copy of the homework solutions into a PDF form and email the file to either the professor

or the EDE main office (they will put it in my mailbox) or 2) Fax a copy of your homework solutions to the EDE main office.

### **Design Project**

In addition to the other requirements of the lecture and laboratory sections, students enrolled in EE 514 and EE 510 must complete an additional design project which will be assigned towards the middle of the semester (tentatively October 4, 2010). Further details will be given in the project.

While Agilent's ADS software will be the preferred tool to use for the project, it is understood that students enrolled in EE 510 may not have access to this software package. There are several student version of CAD software available for download (e.g., LTSpice) that will also be suitable for using to complete the design project. It is also possible that ADS will be available to EE 510 students via remote access.

### **Exams**

There will be two (2) in-class exams and one final exam for this class. The date and time for the final exam depends on the registrar's schedule. Students will be allowed to bring on page of notes to each of the exams. One page is defined to be one 8.5" x 11" (or A4) sheet of paper, front and back. Otherwise all exams are closed book and closed note. The use of any wireless devices is strictly prohibited during exams. Making up a missed exam will only be considered in extreme circumstances of which the professor must be notified of prior to the actual exam.

Students enrolled in EE 510 will be responsible for scheduling a proctor to take the exam. Off-campus students will have seven (7) days from the day that the on-campus students take their exam in which they can take the exam and submit the completed exam to the EDE office.

### **Labs**

Lab sections will meet weekly in 2061 Coover. The ultimate goal of the lab will be for the students to design, fabricate, and test a simple ~1 GHz microwave transmitter consisting of an oscillator, filter, and amplifier. Students will work in groups of two or three for all laboratory exercises and only one lab report will be required per group. It is expected, however, that each student will have a current copy of all relevant files and be familiar with the current status of the project. Lab reports will be due the week following the completion of the laboratory exercise.

Lab write-ups will be posted online. While the majority of the labs can be completed using Spice, the laboratory exercises are designed to use Agilent's ADS program which will be available in 2061 Coover. Some labs will consist of measuring and characterizing various components. During these times students should meet in 3014 Coover.

Labs are not required for students enrolled in EE 510. If such a student wishes to register for the laboratory section, it is usually required that the student come to campus on three separate occasions: 1) once at the beginning of the semester for component characterization, 2) once just before Fall break to turn in design files for fabrication, and 3) once at the end of the semester to assemble, test, and report on the final design. In some cases it may be possible for the student to complete the lab without coming to campus and students interested in this option should contact the professor for more information.

**Grading**

	<u>EE 414</u>	<u>EE 514</u>	<u>EE 510</u>
- Homework	15%	15%	20%
- Exams (2)	30%	25%	33%
- Final	25%	20%	27%
- Laboratory	25%	25%	-
- Participation	5%	-	-
- Design Project	-	15%	20%

**Late Policy**

No late homework assignments or projects will be accepted without prior approval from the professor.

**Students with Disabilities**

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me soon. Please request that a Disability Resources staff send a SAAR form verifying your disability and specifying the accommodation that you will need.