Course Change Proposal
Form A

Academic Group (College):
College of Engineering

Academic Organization (Department):
Electrical & Electronic Engineering

Date:
March 16, 2010

Type of Course Proposal:
New _X__ Change ___ Deletion ___

Department Chair: S. Vadhva
Submitted by:
M. Markovic

Does this course fulfill a requirement for
single-subject or multiple subject credential
students? Yes ___ No _X_

For Catalog Copy: Yes _X___ No ___

CCE (Extension): Yes ___ No _X_

Semester Effective:
Fall _X___ Spring __, 2010

This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number):
EEE 296N

If changing an existing course, should new version be considered a repeat of the original version? If
so, the same Course ID will be maintained. If not, a new Course ID will be assigned. Note: In
PeopleSoft terminology, the Course ID is the unique system identifier, not the Catalog Nbr.

Yes _X___ No ___

Change from:

Subject Area (prefix) & Catalog Nbr (course no.):
EEE296N

Title: Computer Aided Design of Microwave Circuits
Units: 3

Change to:

Subject Area (prefix) & Catalog Nbr (course no.):
EEE214

Title: Computer Aided Design of Microwave Circuits
Units: 3

JUSTIFICATION:

This course was offered several times in the past under different temporary names. It always had at least 10
students enrolled. Currently we do not have a course that teaches nonlinear communication circuit design.
Permanent number is requested for the course.

NEW COURSE DESCRIPTION: (Not to exceed 80 words, and language should conform to catalog copy. See
http://www.csus.edu/unmanual/acad.htm - Guidelines for Catalog Course Description

Introduction to design methodology of the basic building blocks of communication systems. Use of solid state
devices in communications and microwave technology. Implementation of transmitter and receiver architectures.
Impedance matching, S-parameters and small-signal, large-signal device operation. Design of transmitter and
receiver components using a professional software tool. Design and simulations of gain and low noise amplifiers,
detectors, mixers, power amplifiers and oscillators. Tradeoffs involved in the design of a complete transmitter and
a receiver.

Note:
Prerequisite: EEE 211 or instructor’s consent
Enforced at Registration: Yes _X___ No ___
Corequisite:
Enforced at Registration: Yes ___ No ___

Graded: Letter _X___ Credit/No Credit ___

Instructor Approval Required? Yes ___ No _X_

Course Classification (e.g., lecture, lab, seminar, discussion):
Lecture

Title for CMS (not more than 30 characters)
CAD Microwave Circuits

Cross Listed?
Yes ___ No _X_

If yes, do they meet together and fulfill the same requirement, and what is the other
course.

How Many Times Can This Course be Taken for Credit? ___Once___

Can the course be taken for Credit more than once during the same term? Yes ___ No _X_
FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:

Description of the Expected Learning Outcomes: Describe outcomes using the following format: “Students will be able to: 1), 2), etc.” See the example at http://www.csus.edu/acaf/example.htm

By the end of this course, you should be able to do the following:
• Use Computer Aided Design (CAD) tool to design communication electronic components.
• Use standard microwave engineer technology, such as detector, mixer, load- pull etc.
• Design and analyze a detector, mixer, low-noise amplifier and oscillator circuit.
• Identify and describe the building blocks of a communication system.
• Identify and design the bias circuit for various semiconductor devices.
• Apply s-parameter simulations in CAD to design small-signal circuits.
• Identify the difference between the large and small signal operation.
• Design large-signal power amplifiers.
• Analyze and design frequency response of electronic circuits involving semiconductor devices at high-frequencies.

**Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean’s office, not Academic Affairs.

Assessment Strategies: A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

Midterm

Final

Final Defense

CAD Projects

For whom is this course being developed?
Majors in the Dept. X____ Majors of other Depts ___ Minors in the Dept ____ General Education ___ Other ___
Is this course required in a degree program (major, minor, graduate degree, certificate)? Yes ___ No ___
If yes, identify program(s):

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes ___ No ___
If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any).

The Department Chair’s signature below indicates that affected programs have been sent a copy of this proposal form.

Approvals: If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

Signatures: ____________________________ Date ________________

Department Chair: Sarah Smith 6/1/2010

College Dean or Associate Dean: 6/1/10

CPSP (for school personnel courses ONLY)

Associate Vice President and Dean for Academic Programs
EEE 214
Computer Aided Design of Microwave Circuits
Instructor: Dr. Milica Markovic

Prerequisites: EEE 211 or Instructor’s Consent.
Required Text:
Literature: The following books are recommended but NOT required:
Software:
Research Papers: will be distributed.
Course description:
EEE214 is designed for electrical engineering graduate students and senior undergraduate students as an advanced electronics class. This course builds upon EEE 211 class to introduce design methodology of the basic building blocks of communication systems. Design of solid state devices used in communications and microwave technology will be discussed. Impedance matching, S-parameters and small-signal, large-signal device operation will be briefly reviewed. The emphasis will be on the design of communication components using Agilent Advanced Design System software. Discussion will include design and simulations of switches, detectors, mixers, modulators, amplifiers, oscillators as well as tradeoffs involved in the design of a complete transmitter and a receiver.
Course objectives:
By the end of this course, you should be able to do the following:

- Use Computer Aided Design (CAD) program ADS to design communication electronic components.
- Use standard microwave engineer technology, such as detector, mixer, load- pull etc.
- Design and analyze a detector, mixer, amplifier, oscillator circuit.
- Identify and describe the building blocks of a communication system.
- Identify and design the bias circuit for various semiconductor devices.
- Apply s-parameter simulations in ADS to design small-signal circuits.
- Identify the difference between the large and small signal operation.
- Design large-signal power amplifiers.
- Analyze and design frequency response of electronic circuits involving semiconductor devices at high-frequencies.

**Course Outline**

**Grading:**
Course grades are based on a weighted sum of problem set scores and midterm and final examination scores, with the following weights:

- **Midterm** - 30 %
- **Final** - 30 %
- **ADS Projects** - 20 %
- **Final Defense** - 20 %

Rough course grades will be assigned during the dead week, to give you an idea of where you stand in the course going into the final examination and the final project presentation.

**Projects:**
It is **recommended** but not required that students do Project assignments in groups of two students. Students will decide who wants to be in which group. Since we recommend that students work in groups Late projects will not be accepted. However, the lowest project grade will be dropped.

It is recommended that the students work in groups of up to three people. The projects will be assigned according to the schedule on the last page. Each project will deal with a certain circuit design and simulation aspect of ADS. Students will submit project report for each project. The requirements for each project will be handed out prior to each assignment. One class a week will be dedicated to introducing a concept in ADS. The students should get enough information during the LAB class to start-off the project. LAB classes will be held in RVR 5017, according to the schedule. The project should be finished by students outside the class.

**Project Team Roles Recommendations**
Team members should individually outline the solutions to project problems. On each group assignment your team should designate a **coordinator** to organize work sessions, make sure everyone knows where and when to meet and understands who is supposed to be doing what, a **recorder** to prepare and turn in the final solution set. The team roles should rotate on every assignment.

**Project format:**
Assigned every other week on Tuesday, due the following Tuesday at the beginning of the class. To help in handling the projects, please do your work on only one side of each page, staple your pages. Write the names and roles of the participating group members, problem set number, and course number on the outside. If a student's name appears on a solution set it certifies that he/she has participated in solving the problems. The problem sets will be graded and returned in lecture. Please see additional recommendations for project presentation.

**Project grading:**
Each problem on a problem set is worth 5 points, with points allocated as follows:

1. Correct - 4
2. Minor Error - 3
3. Major Error  -  2
4. Attempt   -  1
5. No Attempt -  0

One (1) point will be added for neatness.
The problem set solutions will be made available on the Web page.

Late Projects:
Since it is recommended that students work in groups, late projects will not be accepted, however the lowest Project grade will be dropped.

ADS Pre-labs
Prelabs consist of reading:

- a specific chapter(s) of ADS manual prior to lab beginning.
- a research paper
- the book sections

Prelabs are not graded, however, it is expected that the students will be familiar with the topics assigned. The prelabs will be available to students generally one week before the lab.

The Final Project Report
The students will choose one project that they worked on during the semester to study in detail. During the dead week the students will submit a report and present and defend the project in front of the class. Project Report will consist of the following sections:

Schematic Diagram
Bill of Material. (List of all components used in the circuit, a template will be provided)
Copies of Manufacturers specifications for each element used in the circuit.
Test Instructions. (Step-by-step instruction process that you would like the technicians to do in order to measure your circuit.)
Assembly Instructions. These are instructions that engineers write to assembly technicians.
Stress analysis
Circuit Specifications
Sensitivity Analysis
Yield analysis
Theory of operation, with DC, AC simulations and sweeps.

More detailed instructions for the project will be handed out later.

The Final Project Presentation
The student will prepare a 15 minutes talk using slides or power-point. Talks will be scheduled during the dead week. The time will be strictly kept to 15 minutes. After the talk there will be 5-10 minutes reserved for questions. A detailed instructions on presentation preparation will be posted on the web-site. The slides or power point presentation need to be approved by the instructor. The milestones for the project will be given at the time of RFP.
Midterm Exam:
Exams: There will be one midterm examinations and a final examination, given under the following schedule:
Final: TBD
The midterm exam will be a take-home exam, however to complete the exam the students need to use the computers in the laboratory RVR5017. The exam problems will be similar to homework and project problems. Students can use ADS features such as template or ADS help. The first midterm will cover the first 4 to 5 weeks of material. The final examination will cover the entire course. The midterm exam is scheduled for the entire week, see the schedule. There will be no lectures during that week. Further information on examination content will be given in class prior to each examination. The midterm exams must be performed individually, no group work is allowed.

Final Exam
The final exam is a take home exam, distributed one week before the dead week. The exam is due the week of finals. The final needs to be defended. The defense is a 10 minute design review of the project.

Final Defense
The final exam is a take-home exam. The students must do the final on their own, no group work is allowed. The design review of the project will be conducted in RVR5017 during the time normally scheduled for the final. The students should have the ADS file that they used to perform the simulations. The sign-up sheet will be circulated during the dead-week. The student should be ready to answer questions about the project. Some of the possible questions that the instructor will ask during the design review will be handed-out together with the final exam.

Missed Tests
Giving a make-up examination is difficult, as the examination requires a considerable amount of time to prepare, and it is difficult to make this examination equivalent to the regularly scheduled one. Therefore, requests for make-up examinations will only be approved in cases where strong written justification can be provided. Acceptable justification includes illness (confirmed in written by a physician) and personal problems (confirmed by personnel at the Counseling Center). Travel arrangements are not an acceptable excuse for rescheduling the examination. You must contact the instructor before the regularly scheduled examination to request approval of a make-up examination. If you miss the midterm or the final exam without a valid excuse, a zero will be averaged into your grade. However, the worst grade out of the two midterms and the final examination will be counted half as much as the other two.

Regrading
If you think you deserve more points on a project, problem set or examination question, write and submit a short note within seven days following the day the graded material is available, indicating what should be reconsidered, attach it to the problem set or examination, and return it to the the instructor. We will review the grading, reassign points if justified, and return the paper in class. Please note that the number of points can
be increased as well as decreased. If you are still not satisfied with your score, please make an appointment with the instructor.

**Calculation of the Course Grade**
A weighted average grade will be calculated as follows:
- 97 or above is guaranteed a course grade of A+
- 92 or above A
- 80 or above at least B
- 70 or above at least C
- 60 or above at least D

**NOTICE:** We do not curve grades in this course. It is theoretically possible for everyone in the class to get an A (or an F). Your performance depends only on how you do, not on how everyone else in the class does. It is therefore in your best interest to help your classmates in every legal way possible.

**Gray areas between guaranteed letter grades:**
There will be a 'gray area' of several points below the specified numerical cutoff grades (except 97), within which a '+' system will be used. Two people getting the same weighted average grade (say, 89) might therefore get different course grades (A- or B+). If you are in one of these gray areas, whether you get the higher or lower grade depends on whether your test performance has been improving (your grade goes up) or declining (it goes down), and whether your participation in group (and class) has been good (up) or inadequate-disruptive (down).

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