ECE 5027: Microwave Electronics

Course Description

Design principles of microwave transistor amplifiers and oscillators; low-noise, power and broadband amplifiers; linearization; computer-aided design; microstrip realizations and testing in the laboratory.

Prior Course Number: 723
Transcript Abbreviation: Microwave Electr
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad, Graduate
Student Ranks: Junior, Senior, Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 4.0
Repeatable: No
Time Distribution: 3.0 hr Lec, 3.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 3020 (323), and enrollment in ECE major; or Grad standing in Engineering, Biological Science, or Math and Physical Sciences.
Exclusions: Not open to students with credit for 723.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Give the student a comprehensive introduction to the design microwave amplifier and oscillator circuits
Introduce the student to the concepts of nonlinear RF measurements, modeling and circuit design
Introduce the use of CAD tools to verify the microwave amplifier and oscillator designed, account for real world implementation effects, and optimize the circuits designed

Expose the students to the measurements of amplifiers and oscillators at microwave frequencies using a network analyzer, a noise meter, a spectrum analyzer and a vector signal analyzer
Involve the students in a team oriented design project where they design, fabricate, and test a microwave amplifier or oscillator circuits and present their results to the class

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Linear and nonlinear representations of active devices	3.0							
Matching networks and signal flow graphs	4.0		1.0					
Microwave transistor amplifier design theory	6.0							
Noise, broadband, and high-power design methods	8.0		8.0					
Microwave transistor oscillator design	7.0							
Nonlinear RF measurement, modeling and circuit design	5.0		8.0					
Linearization of amplifiers and modulators	4.0		6.0					
Design, simulation, fabrication and testing a microwave electronic circuit			10.0					

Representative Assignments

Homework problems are assigned by the instructor
Computer aided simulation
Lab reports
Poster on design project
Oral presentation of design project

Grades

Aspect	Percent
Homework 25% (include computer assignments)	20%
Midterm #1	20%
Midterm #2	20%
Laboratories: lab #1 (1/4), lab #2 (1/4), lab #3 (1/4), design project (1/4)	20%
Final exam	20%

Representative Textbooks and Other Course Materials

Title	Author
Microwave Transistor Amplifiers	Guillermo Gonzalez

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.

Course Contribution		College Outcome
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Change prereqs nd exclusions to match university version.

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