

ECE 5017 (Proposed): Microwave Engineering

Course Description

Transmission line theory; multiconductor; S-parameters; transformers, couplers, filters, resonators, circulators; electromagnetic interference and compatibility; computer-aided design; microstrip realization and testing with a network analyzer.

Prior Course Number: 710

Transcript Abbreviation: Microwave Circuits

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Senior, Masters, Doctoral

Course Offerings: Autumn

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: 3010 (312), and enrollment in ECE major; or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Exclusions: Not open to students with credit for 710.

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 microwave circuit design which provides practical design theories for the design and synthesis of passive microwave circuits
Introduce the use of CAD tools to verify the microwave circuits designed, account for real world implementation effects, and optimize the microwave circuits designed

Expose the students to the measurements of microwave circuits using a network analyzer
Involve the students in a team oriented design project where they design, fabricate, and test a microwave circuit and present their results to the class

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Transmission lines (review) and multiconductor lines	5.0		4.0					
Waveguides	3.0		2.0					
Broadband impedance matching	5.0							
Scattering parameters	4.0							
Passive devices components (tee, divider, couplers)	6.0		3.0					
Resonators and narrowband filters	4.0		1.5					
Broadband and periodic filters	7.0		1.5					
Circulators and isolators	3.0		3.0					
Introduction to electromagnetic interference and compatibility (EMI/EMC)	3.0							
Design, simulation, fabrication and testing of a microwave circuit			10.0					
In class presentation of design projects			3.0					

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 (include computer assignments)	15%
Midterm #1	20%
Midterm #2	20%
Final exam	20%
Laboratories: lab #1 (1/4), lab #2 (1/4), lab #3 (1/4), design project (1/4)	25%

Representative Textbooks and Other Course Materials

Title	Author
<i>Microwave Engineering</i>	David Pozar

ABET-EAC Criterion 3 Outcomes

Course Contribution	College Outcome
***	a An ability to apply knowledge of mathematics, science, and engineering.

Course Contribution		College Outcome
***	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.
	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 to match CORRECTIONS THAT WE SUBMITTED TO UNIVERSITY. Their original ordering changed the order, and thus the meaning of the prereqs. Exclusion changed to match university version.

Updated text edition to 4th, 4/3/12.

Edited text info, 5/10/17, CED

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