ECE 5022 (Proposed): Radio Frequency Integrated Circuits

Course Description

Modulation, wireless standards, transceiver architecture, transistor models, passive component models, LNA, VCO, PLL, Mixers, integrated PA, RFIC layout.

Prior Course Number: 620
Transcript Abbreviation: RFICs
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad, Graduate
Student Ranks: Senior, Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
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 or concur: 5021 (722), or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.
Exclusions: Not open to students with credit for 620.
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

Learn principles of RF systems and understand tradeoffs in system?s sensitivity and linearity
Learn aerial access techniques (i.e. duplexing and multiple access)
Basic understanding of RF active and passive device modeling and RF layout
Understand principle of phase noise and its impact on transceivers

Learn fundamental design principles of RF blocks (e.g. LNAs, Mixers, VCOs, PAs)

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Noise figure and sensitivity	3.0							
Linearity (IP2, IP3)	3.0							
Aerial access and modulation	4.0							
Phase noise	2.0							
Transceivers systems design	4.0							
Impedance matching and transformation	2.0							
RF device modeling	2.0							
Low noise amplifiers (LNAs)	4.0							
Mixers	3.0							
Voltage-controlled oscillators	4.0							
Phase-locked loop	4.0							
Power amplifiers	4.0							

Representative Assignments

Homeworks
Computer Aided Simulation Projects
Midterm Exam
Final Project

Grades

Aspect	Percent
Homeworks	20%
Projects	20%
Mideterm Exam	30%
Final Project	30%

Representative Textbooks and Other Course Materials

Title	Author
Wireless Receiver Design for Digital Communications	Kevin McClaning

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.
***	e	An ability to identify, formulate, and solve engineering problems.

Course Contribution		College Outcome
	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 and exclusions to match university version.
Deleted two texts and added McClaning per area 1/28/12

Change 5021 from pre to co 4/23/12

Edited text info, 5/10/17, CED

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