Course #: ECE7822  
Course Title: Advanced Nonlinear Microwave Circuit Engineering

Catalog Description:

Large-signal characterization and modelling of nonlinear RF circuits; power amplifiers; oscillators; modulators; wideband linearization; power efficient design.

Qtr/Yr. of Offering: Fl 2013  
Credit Hrs: 3  
Level: 7000/8000

Course Prerequisites: ECE5027 or permission of instructor

Prerequisites by Topic: ECE5027: basic RF amplifier and oscillator design theory

Courses that require this as a direct prerequisite: None

Text(s): to be announced

References:  

Course Objectives:

Modern RF radios developed for broadband services require non-linear RF front ends which handle wide bandwidth, operate linearly and are power efficient. This course will introduce microwave/RF engineers and researchers to modern large-signal characterization, design and linearization techniques which have been developed to address these challenges.

Topics and (# of Lectures):

1. Introduction: Wireless Signals (5 lectures)
2. Large Signal Vector Measurement Techniques with LSNAs (5 lectures)
3. Direct Model Extraction of Transistor from Large Signal Load-lines (5 lectures)
4. Characterisation and Modelling of Memory Effects in RF Power Transistors (5 lectures)
5. Interactive Load-line Based Design of Power RF Amplifiers (5 lectures)
6. Amplifier Behavioral Modeling (5 lectures)
7. Kurokawa Theory of Oscillator Design and Phase-Noise Theory (5 lectures)
8. Characterization and Linearization of IQ Modulators (5 lectures)
9. Frequency Selective Linearization of Power RF Amplifiers with Memory (5 lectures)

Class Meeting Pattern: Mo, We, Fri

Relationship of Course to Program Outcomes and Objectives:

The proposed course which is a continuation of the course/laboratory ECE5027 will present advanced microwave engineering materials not covered in the ECE curriculum.

Assessments: homework, midterm, participation, term paper/project

Grading: ¼ homework, ¼ midterm, ¼ term paper, ¼ final exam/project