

ECE 585: MICROWAVE ENGINEERING II

Spring 2020

Dept. of Electrical & Computer Engineering

Summary: This course is a continuation of ECE 584 dealing with the analysis and design of several multi-port microwave circuit devices, the unique properties of ferri-magnetic materials and their use in non-reciprocal components, and an introduction to active microwave circuits.

Major Course Topics

Multi-port Microwave Devices (~3 wks): Power Dividers, Directional Couplers, Hybrids

Microwave Filters (~3 wks): Periodic Structures, Filter Design by Image Parameter and Insertion Loss Methods, Filter Implementations

Ferrimagnetic Components (~2 wks): Properties, Isolator, Circulator, Gyrator, Phase Shifter

Noise & Active Devices (~2 wks): Noise Figure & Temperature, Dynamic Range, Distortion

Basic Amplifiers & Oscillators (~3 wks): Power Gains, Stability, Phase Noise, Mixers

Prerequisites:

Microwave Engineering I (ECE 584) or equivalent

Schedule:

MWF 12:20--1:10 PM in sunny ELAB 306

Instructor:

Stephen J. Frasier, frasier@umass.edu – please include ECE-585 in subject line
Office: 113A KEB. Tel: 5-4582. Office hours: By appointment.

Teaching Assistant: TBD

Textbook:

Microwave Engineering, 4th ed., 2012, David Pozar, John Wiley & Sons.

Homework:

Periodic assignments announced in class. Some may be computer exercises.

Grading:

Homework: 20%, Midterm Exam on 3/11/2020: 40%, Final Exam: 40%

Course Objectives:

Students completing this course should be able to:

1. Understand the theoretical principles behind microwave devices and networks.
2. Design microwave circuit components such as power dividers, hybrids, and filters.
3. Understand the basic properties of components employing ferrimagnetic materials.
4. Understand and quantify the effects of noise in active microwave circuits.
5. Understand concepts of Power gain and stability in microwave circuits.