

ECE 5104 RF & Microwave Engineering and Applications (3C)

A review of basic electromagnetics. Transmission lines, waveguides, microstrip lines, striplines. Microwave networks and impedance matching, Smith chart, S-Matrix, ABCD matrix, transformers. Microwave filters. Active RF components. Microwave amplifier design. Microwave systems. Microwave Integrated Circuits (MIC). RF Microelectromechanical System (MEMS) components. RF components for wireless systems. RF components for ULtra Wideband (UWB) systems.

What is the reason for this course?

RF and microwave components constitute important parts of the communication system. Many of the students at the graduate level lack the fundamentals of microwave components, their design and integration in the overall system. Combining the design concepts and the role of microwave components in different state-of-the-art application areas in one course may be of interest to students in the communication and electromagnetic areas. The course builds on the fundamentals that are covered in the prerequisite course. However, some topics in the prerequisite course are reviewed for completeness.

Program Area: Electromagnetics.

Prerequisites: ECE 4104 or equivalent, or instructor's permission.

Why are these prerequisites or corequisites required?

ECE 4104, Microwave and RF Engineering, or equivalent courses on electromagnetics and circuits.

Department Syllabus Information:

Major Measurable Learning Objectives:

- Describe the operation and analyze the performance of basic microwave components
- Design basic microwave components to meet certain specifications
- Analyze microwave systems and assess the impact of microwave component performances on overall system performance
- Assess qualitatively and quantitatively the role of microwave components in the application areas of MIC, MEMS, wireless systems and UWB systems

Course Topics	
Topic	Percentage
Introduction, Review of Basic Electromagnetics	5%
Transmission Lines, Waveguides, Microstrip Lines, Striplines	8%
Microwave Networks and Impedance Matching, Smith Chart, S-Matrix, ABCD Matrix, Transformers	8%
Microwave Filters	8%
Active RF Components	7%
Microwave Amplifier Design	8%
Microwave Systems	10%
Microwave Integrated Circuits (MIC)	10%
RF Microelectromechanical System (MEMS) Components	12%
RF Components for Wireless Systems	12%
RF Components for Ultra Wideband Systems	12%