

## **ECE 47400 – Introduction to Radio Frequency Circuit Design**

### **Type of Course**

Elective for EE Program

### **Catalog Description**

An introductory course for the analysis, design and simulation of radio frequency (RF) circuits and components for communication systems and industrial applications. It concentrates on such topics as fundamental concepts of transmission line theory, high frequency circuit behavior, designing tuning and matching networks, filter networks, power amplifiers, smith chart, two port networks and S-parameters.

### **Credits**

3

### **Contact Hours**

3

### **Prerequisite Courses**

ECE 25500, PHYS 25100

### **Corequisite Courses**

None

### **Prerequisites by Topics**

Knowledge of vector calculus, electrostatics, and magnetostatics. Maxwell's equations. Understanding of electromagnetic waves, transmission lines, and radiation from antennas

### **Textbook**

R. Ludwig, P. Bretchko, RF Circuit Design: Theory and Practice, Prentice Hall; 2 edition (April 19, 2008)

### **Course Objectives**

To have understanding of the fundamental concepts of transmission line theory, high frequency circuit behavior, designing and tuning and matching networks, filter networks, power amplifiers, smith chart, two port networks and S-parameters. Being able to use CAD tools such as Sonnet in the design of RF circuits.

### **Course Outcomes**

#### **Students who successfully complete this course will have demonstrated**

1. A basic knowledge of general RF circuits, components and systems. [1]

2. An understanding of resonant circuits. [1]
3. An ability to use Smith Chart in RF applications.[2]
4. An ability to design impedance matching networks and passive RF filters. [2]
5. An understanding of two port networks and S-parameters. [1]
6. An ability to use CAD tools in RF circuit design. [2]

### **Lecture Topics**

1. RF characteristics of RF components
2. Resonant circuits
3. RF inductor and transformer design
4. Filter Design
5. Smith chart and its applications
6. Transmission Lines
7. Matching Networks
8. Two-port networks
9. Scattering parameters
10. RF power amplifier design
11. Use of CAD tool in RF circuit design

### **Computer Usage**

Medium

### **Laboratory Experience**

None

### **Design Experience**

Medium

### **Coordinator**

TBD

### **Date**

September 30, 2018