

## EEE 194 - Radio Frequency and Microwave Engineering - Spring 2001; Rev 2.1

### Catalog

**Description:** Radio Frequency and Microwave Engineering, 4 hrs.

An introduction to the design and analysis of active and passive radio frequency and microwave circuits. Topics include radio frequency and microwave circuit analysis, measurement methods, transmission line structures, matching networks, oscillators, and mixers. Computer-aided analysis and design. Three hours of lecture and one laboratory weekly. Prerequisites: MATH 110B, EEE 132, EEE 171. Co-requisite: EEE 170.

**Textbooks:** Reinhold Ludwig and Pavel Bretchko, RF Circuit Design: Theory and Applications, Prentice Hall, 2000.

**Reference:** D. Pozar, Microwave Engineering, 2<sup>nd</sup> Ed., Wiley, 1998.

**Instructor:** Ernie Kim, P.E., Associate Professor of Electrical Engineering

**Learning Objectives:** Students completing this course will be able to:

1. Specify and design passive radio frequency and microwave circuits.
2. Specify and design active radio frequency and microwave amplifiers.
3. Specify and design discrete and stripline matching networks.
4. Specify and design generic forms of oscillators and mixers.
5. Complement their designs with state-of-the-art radio frequency & microwave simulation tools

### Assessment:

1. Two interim 55 minute quizzes - 30%
2. One two hour final examination - 30%
3. Assignments - 20%
4. Laboratory Reports - 20%

### Topics:

1. Components of RF and microwave design (1 session)
2. Behavior of passive components (2 sessions)
3. Scattering parameters and signal flow diagrams (3 sessions)
4. Using Smith Chart for design (4 sessions)
5. Microstripline circuits (3 sessions)
6. Passive networks and RF filters (5 sessions)
7. Active RF components (2 sessions)
8. Matching networks to active components (4 sessions)
9. Transistor amplifiers (5 sessions)
10. Oscillators (4 sessions)
11. Mixers (4 sessions)
12. Exams (2 classes)

### Laboratory Topics:

1. Introduction to S-Parameter Design (1 week)
2. Measurement of passive components (1 week)
3. Scattering parameter measurements (1 week)
4. Introduction To HP ADS (1 week)
5. Matching Networks with HP ADS (1 week)
6. RF and microwave filter design (2 weeks)
7. RF Transistor Amplifier Design (2 weeks)
8. RF Oscillator Design (2 weeks)
9. RF Mixer Design (2 weeks)

### Estimated ABET Category:

Engineering Science: 2.0 credits or 50%  
Engineering Design: 2.0 credits or 50%

Prepared By: Ernie Kim [Rev. 2.0] Date: 16 February 2000