

1997-99 Class Catalog Data

RF and Microwave Engineering provides the circuit-treatment of electromagnetism and engineering training on wireless design. The goal of the course is to introduce the basic theory and skills for future RF-Microwave engineers focusing on circuits-systems that are critical to modern radar, wireless communications and electromagnetic compatibility. The course mainly serves the increasing demand from RF and microwave industries, and intends to deliver both advanced theoretical tools and hands-on hardware experience (Sp).

Prerequisites: ECE3613, ECE3713

Textbook: David M. Pozar, Microwave Engineering, John Wiley & Sons, ISBN 978-0-471-44878-5, 2005

References: None

Course Objectives: To provide theoretical analysis of transmission lines and microwave circuits, hands-on training on engineering tools such as Smith Chart, EDA software and RF instruments. Obtain engineering design experience through team-based design projects.

Coordinator: Yan Zhang

Prerequisites by Topic: Electromagnetics and Maxwell equations, basic analog circuit theories.

Topics:

1. Review of Electromagnetic and circuit theory (1 lecture)
2. Transmission line theory, waveguide and signal integrity (4 lectures)
3. Planar transmission line design and measurement (including microstrip and striplines) (3 lectures)
4. Microwave network (S-parameter analysis and measurement) (2 lectures)
5. Impedance matching and tuning (3 lectures)
6. Passive microwave circuits (3 lectures)
7. Active microwave circuits (3 lectures)
8. RF-Microwave systems design (3 lectures)

Schedule: Lecture – 3 hours per week

Computer Usage: Ansoft Designer, Agilent ADS, MATLAB, and other tools.

Design Projects:

1. Passive planar circuits
2. MMIC active circuit applications
3. RF receiver specification simulation/measurement

Laboratory Projects: All design projects are performed in a RF/engineering lab facility.

Assessment Methods Used: Standard course evaluation.

Contributions to Professional Component:

Science: 1.5 credits or 50%

Engineering: 1.5 credits or 50%

Program Objectives, Related Strategy, and Actions:

2.i, 3.ii

ABET 2000 Criterion 3 Contents:

c, k

Prepared by: Yan Zhang Date: Dec 12, 2008

ECE5973 ABET MTO a-k Element Coverage

1. ABET element *c* (design system and component with engineering constraints)

The class lectures introduces step-by-step procedures on design RF system and components. For example, the designing of RF filters is covered in lectures, homework problems, and also lab projects. The specifications and cost constraints are given in the lab project, the students need to design and implement the actual filter within time limit, the design and test reports are graded based on the performance of the fabricated circuits and time management.

2. ABET element *k* (ability to use techniques, skills and modern engineering tools)

The OU's Radar Innovations laboratory (RIL) provides students the access and practicing of the world-class design tools and RF-Microwave instruments (<http://arcc.ou.edu/ril/>). For example, students learn how to use the combined Ansoft Designer and Agilent ADS to design the schematic and simulation of a planar RF circuit, use PCB layout tool (Altium Designer) to conduct the physical design, send the design to fabrication, assemble the circuit, and use the advanced Agilent PNA network analyzer to characterize the prototype. This process matches the current work flow in real engineering institutions, and give students valuable experience for future professional careers.