# ABET Course Syllabus EEE445

1. **Course:** **EEE 445 Microwaves**
2. **Credits and Contact Hours:** 4 Credit Hours (lecture, lab), Topics: Engineering
3. **Course Coordinator:** Dr. George Pan, Professor
4. **Textbook:** D.M. Pozar, *Microwave Engineering*, Addison-Wesley, 1990.

**Supplemental materials:**

* R.S. Elliott, *An Introduction to Guided Waves and Microwave Circuits*, Prentice-Hall, 1993.
* R.E. Collin, *Foundations for Microwave Engineering*, McGraw-Hill, 1996.
* D.K. Chen, *Field and Wave Electromagnetics*, Addison-Wesley, 1989.
* Ramo, Whinnery, and Vanducer, *Fields and Waves in Communication Electronics*.

1. **Specific** **course** **information**
2. **Catalog description:** Waveguides; circuit theory for waveguiding systems; microwave devices, systems, and energy sources; striplines and microstrips; impedance matching transformers; measurements.
3. **Prerequisites or co-requisites:** EEE341.
4. **Required/elective/selected elective:** Elective
5. **Specific goals for the course**

To acquaint students with microwave circuits and systems

1. **Outcomes of instruction:**
2. Students will acquire the skills to identify and solve problems including microwave circuits and systems such as microstrip lines, couplers, hybrids, and waveguides
3. **Outcomes of Criterion 3 addressed by the course:**

**(1)** Use of math and engineering principles, use of modern tools for simulation

**(6)** Lab experiments and testing.

1. **Brief list of topics to be covered**
2. Review of transmission lines and waveguides (Chapter 4)
3. Microstrip and striplines (Chapter 4)
4. Microwave network analysis (Chapter 5)
5. Review of different matching techniques (Chapter 6)
6. Multisection and tapered matching (Chapter 6)
7. Review of transmission line and waveguide resonators (Chapter 7)
8. Other types of microwave resonators (Chapter 7)
9. Dividers, couplers, hybrids (Chapter 8)
10. Active microwave circuits (Chapter 11)

A general introduction to microwave systems and applications of microwaves will be discussed as well.

**Computer Usage:**

1. A design project and simulation, including the following project topics:
2. Hybrid couplers
3. Coupled lines
4. Matching networks

**Laboratory Experiments:**

1. Students meet weekly for a three-hour laboratory under the guidance of a TA.
2. Network analyzers
3. Bandpass filter
4. Isolator and circulator microstrip line
5. Microcircuit bandpass filter
6. Time domain measurement
7. Power measurement
8. Cavity and resonator

**Course Contribution to Engineering Science and Design:**

Student learn to design, simulate and test basic microwave circuits including matching circuits, couplers, and resonators.

Person preparing this description and date of preparation: George Pan, Jim Aberle, K. Tsakalis, June, 2021.