Electrical Engineering Department
King Fahd University of Petroleum & Minerals

Course Number: EE 407
Course Title: Microwave Engineering (Required Course)

Course Description :

Introduction to rectangular waveguides. Limitations of low-frequency components. Microwave materials (semiconductors, ferrites, etc.). Microwave tubes and solid-state devices: klystrons, magnetron, Gunn, Impatt, etc. Microwave circuit design. Directional couplers. Power dividers, equalizers, phase shifters. Microwave integrated circuit design: filters and amplifiers. Applications of microwaves.

Prerequisites :

Electromagnetics (EE 340)

Textbook :

David.M. Pozar, 'Microwave Engineering', 4th Edition, Wiley, 2005, John Wiley & sons, Inc, ISBN 0-471-64451-x

Other useful references and material :

Reference texts: - T. Koryo Ishii, *Microwave Engineering*, 2nd Ed., Harcourt and Brace Jovanovich,1989.
- K.C. Gupta, *Microwtrip lines and Slot lines*, 2nd ed, Artech House, ISSBN:0-89006-766

Website: https://webcourses.kfupm.edu.sa/ or http://ocw.kfupm.edu.sa/

Course objectives:

After successfully completing the course, the students will be able to

- Provide a comprehensive understanding of microwave circuits and the field of microwave engineering
- To be able to analyze and design passive and active microwave circuit components
- To understand the properties of microwave tubes and oscillators
- Apply and practice the electrical engineering knowledge with professional ethics and safety.

Topics Covered :

- Microwave engineering and Plane waves
- High frequency Transmission
- Smith chart and matching networks

- Introduction to CAD softwares
- Transmission lines, discontinuities and S-parameters
- Basic passive components and Ferrite devices
- Basic Active components, Microstrip Active and Integrated Circuits
- Applications of microwave circuits

Class/Laboratory Schedule :.

3 lectures per week (50 minutes each) and 3 hours lab per week.

Contribution of course to Meeting the professional component :

The students will learn existing theories related to microwave propagation and active and passive microwave components. The course will emphasize on the use of CAD tools, such as CAEME, HFSS and ADS, to aid the design and analysis process. Laboratory projects are designed to promote and strengthen the knowledge acquired in this course. The course project is intended to test the innovativeness, theoretical knowledge and CAD skills of the students.

Relationship of Course to program outcomes

- An ability to formulate and solve microwave propagation related problems using basic knowledge of math, and Electromagnetic theory.
- An ability to design microwave/RF circuit components to meet desired requirements.
- An ability to use CAD tools and network analyzer for basic microwave device simulation and testing.

Prepared by Dr. Sheikh Sharif Iqbal, November 5, 2006.