

EEE 211: MICROWAVE ENGINEERING

Indicate Required or Elective Course here Elective

Date: Enter 02/28/2007

Indicate Course Area here Communications

Course Coordinator: B.P. Kumar

Catalog Description:

EEE 211. Microwave Engineering. High-frequency passive electronic circuit design, specifically S-parameters, impedance matching, microstrip lines, filters, couplers and antennas. 3 units.

Prerequisites: EEE 161 or equivalent & EEE 108 or equivalent,

Text: 'Microwave Engineering' by D.M. Pozar, John Wiley & Sons, Inc., Third Edition.

Additional Resources:

References: 'Advanced Design System', Agilent-EEsof Manual
MATLAB Manual

Course Objectives:

This course lays foundation of microwave engineering by looking at basics such as scattering parameters for microwave measurement, and practical transmission lines such as waveguides, microstrip and stripline. Then the course covers mainly passive microwave devices, used in the matching, filtering and coupling of signals in the frequency range of 1-20 GHz. Specifically, the course gives students an in-depth knowledge of the design, simulation, fabrication and measurement of microwave impedance matching networks, filters, couplers and antennas.

Prerequisites by Topic:

1. Basic Electromagnetic Theory
2. Network Parameters such as $[Z]$, $[Y]$, ABCD.
3. Transmission Line theory

Topics Covered:

1. Scattering Network Parameters
2. Use of Network Analyzer
3. Passive microwave devices such as couplers, filters and impedance matching networks.

Evaluation:

Midterm I:	20%
Midterm II:	20%
Finals:	30% (comprehensive)
Homework:	10%
Projects:	20%

Contribution of Course to the Professional Education Component: Indicate how this course fulfills this ABET requirement (e.g., developing student's analytical and critical-thinking skills, science and design content, etc.) **Note: This section is not required for graduate courses.**

Relationship of Course to Program Outcomes: Indicate how this course fulfills this ABET requirement (e.g., knowledge of mathematics, engineering science, core topics in major, development of problem solving skills, etc.) **Note: This section is not required for graduate courses.**

Course Outline/Schedule

<i>Week</i>	<i>Topic</i>	<i>Text Reference</i>
1	Review of Maxwell's Equations Propagation & Scattering Transmission Line theory	Ch. 1, 2.1- 2.4
2	Transmission Lines: Waveguides	3.1-3.5
3	Transmission Lines: Microstrip and Stripline	3.7-3.8
4	Microwave Network Analysis	4.1-4.4
5	Narrow band matching: Lumped, distributed matching	5.1-5.4
6	Review and Midterm 1	
7	Broadband matching: Binomial transformers Chebyshev transformers, Tapered lines	5.5-5.8
8	Project 1 lab	
9	Power Dividers	7.1-7.3
10	Directional Couplers	7.6-7.8
11	Review and Midterm II	7.1-7.11
12	Microwave Filter Design	9.1-9.4
13	Project 2 lab	9.7
14	Microwave Antenna Fundamentals, Microstrip Antenna Design	12.1, Handouts
15	Lab completion and review	11