

**KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS**  
**ELECTRICAL ENGINEERING DEPARTMENT**  
**EE#405 MICROWAVE TRANSMISSION. Term (091)**

Instructor: Dr. Essam E. Hassan, 59/2100. Tel:2370, email: [ehasan@kfupm.edu.sa](mailto:ehasan@kfupm.edu.sa)

Office hours: S,,M,W: 9-10 AM., U:10:30-12 AM Book: Microwave Engineering, 2<sup>nd</sup> Edition by D. Pozar

Tentative materials to be covered:

- I- Transmission Line Theory**
  - 1- Transmission line equation
  - 2- Voltage and impedance of lossless transmission line
  - 3- Smith Chart
  - 4- Quarter wavelength transformer
  - 5- Lossy transmission lines
- II- Waveguides**
  - 1- Solution of rectangular waveguide. The TE and the TM modes
  - 2- Attenuations in Waveguides
  - 3- Circular waveguides and modes of operations
  - 4- Strip and microstrip lines.
- III- Microwave Network Analysis**
  - 1- Equivalent voltage and current
  - 2- Impedance and admittance matrices
  - 3- The scattering matrix
  - 4- Discontinuities in wave guides
  - 5- Excitation of waveguides
- IV- Impedance Matching and Tuning**
  - 1- Single and double stub matching
  - 2- Quarter wave transformer
  - 3- Tapered lines.
- V- Microwave Resonators**
  - 1- Series and parallel resonators
  - 2- Short circuit and open circuit transmission line resonators
  - 3- Rectangular and circular waveguide cavities
  - 4- Dielectric resonators
  - 5- Excitations of resonators
- VI- Power Dividers and Directional Couplers**
  - 1- Three and four ports network
  - 2- The T junction power divider
  - 3- Wilkinson power divider
  - 4- Directional couplers
  - 5- The quadrature hybrid
  - 6- Coupled line couplers
  - 7- The Lange coupler
  - 8- The hybrid coupler and the magic T
- VII- Microwave Links and Wireless Communication**
  - 1- Troposphere propagation
  - 2- Ionosphere propagation

Wk	Day	Date	Topics	Text	Quiz & HW due	Laboratory/Tutorial
1	S M W	3 -7 Oct	Topic I	Chapter 2		No Lab
2	S M W	10 – 14	Topic I	” ” ” ”		No Lab.
3	S M W	17 - 21	Topic II	Chapter 3	HW 1 Due Quiz 1	Exp#1
4	S M W	24 - 28	Topic II	” ” ” ”		Exp#2
5	S M W	31 – 4 Nov	Topic II	” ” ” ”	HW 2 Due Quiz 2	Exp#3
6	S M	7 - 11	Topic III	Chapter 4		No Lab
	T	10 Nov	<b>Major Exam I, November 10</b>			
	W		” ” ” ”			
7	S M W	14 - 18	Topic III	” ” ” ”		Exp#4
<b>EID AL-ADHA VACATION, SAT. 21 NOV. –WED. 2 DEC, 2009</b>						
8	S M W	5 – 9 Dec.	Topic IV	Chapter 5	HW 3 Due Quiz 3	Exp#5
9	S M W	12 - 16	Topic IV	” ” ” ”		Exp#6
10	S M W	19 - 23	Topic V	Chapter 6	HW 4 Due Quiz 4	Exp#7
11	S M W	26 - 30	Topic V	” ” ” ”		Exp#8
12	S M	2 – 6 Jan	Topic VI			No Lab
	T	5 Jan..	<b>Major Exam II, January 5, 2009</b>			
	W		Chapter 7			
13	S M W	9 - 13	Topic VI	” ” ” ”	HW 5 Due Quiz 5	Exp#9
14	S M W	16 - 20	Topic VII	Delivered	HW 6 Due	Lab#10
15	S M W	23 - 27	Topic VII	Materials	Quiz 6	Lab Exam.
<b>Final Exam, To be scheduled by Registrar</b>						

**Grade Distribution:**

**Major Exam. 15% each,  
Laboratory 20%,**

**Class work + Quizzes + Project: 20 %  
Final Exam. (Comprehensive) 30 %**