KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF ELECTRICAL ENGINEERING

EE 422

ANTENNA THEORY

SECOND SEMESTER 2009/2010 (092)

Instructor's name : Dr. Mahmoud M. Dawoud
Office : 59/2070 Tel: 2299 email: ***mmdawoud@kfupm.edu.sa***

Office hours : U.T. : 9:00 - 9:50 am ***or by appointment.***

Laboratory Instructor: Mr. Umar Johar Office: 59/0044

Bulletin :

Types of antennas. Antenna fundamental parameters. Transmission formula and radar range equation. Radiation integrals. Linear wire antennas. Antenna arrays. Synthesis of far field patterns by array factors. Design of Dolph-Chebyshev arrays. Broadband antennas and matching techniques. Methods of antenna measurements.

***Prerequisite*:** **EE 340**

Grade distribution:

Laboratory	**20 %**
Two major exams	**30 %**
Quizzes, homework & attendance	**15 %**
Design project	**5 %**
Final comprehensive examination	**30 %**

Lab. Marks:

20 % of the final marks are on the lab. performance which is distributed as

1) Attendance, completion of the experiment, and reports **15 Marks**
2) Final lab. test **5 Marks**

Textbook :

"Antenna Theory: Analysis & Design" by C. Balanis, John Wiley & Sons Inc., 2nd edition, 1997.

Tentative Schedule

Week	Date	Topics	Text sections	HW's	Lab & Prob. sessions
1	Feb. 21-23	Introduction, definitions, types of antennas, current distribution, antenna developments.	1.1, 1.2, 1.3, 1.4, 1.5	----	----
2	Feb. 28-March 2	Fundamental parameters of antennas, radiation pattern, rad. intensity, directivity, numerical techniques.	2.1-2.6	Set # 1	Introduction to the lab. No Exp.
3	March 7 -9	Gain, efficiency, HPBW, bandwidth, polarization, input impedance, effective aperture	2.7-2.9, 2.11-2.15	----	Exp. # 1
4	March 14 -16	Directivity, max. effective aperture, Friis trans. formula, antenna temperature, vector potential, soln. of the inharmonious vector potential wave eqn.	2.16-2.18, 3.1-3.5	Set # 2	Prob. session # 1
5	March 21-23	Far-field radiation, duality, reciprocity, infinitesimal dipole, radiated fields, rad. resistance, directivity, small dipole.	3.6-3.8, 4.1-4.3	***Major # 1***	computer assignment # 1
6	March 28-30	Finite length dipole, half wavelength dipole.	4.5, 4.6	Set # 3	Exp. # 2
7	April 4-6	Antenna arrays, 2-element array, N element array, Broadside & endfire arrays, phased arrays.	6.1 -6.3	----	Prob. session # 2
8	April 11-13	Directivity of linear arrays, linear arrays with non-uniform amplitudes, binomial array.	6.4 - 6.7	Set # 4	Exp. # 3
April 17 - 21		Midterm vacation			
9	April 25-27	Dolph-Chebyshev arrays, self and mutual impedances of linear elements and arrays	6.7.3, 8.5	----	computer assignment # 2
10	May 2-4	Input impedance of dipole, induced emf method, mutual impedance between linear elements.	8.6	Set # 5	Exp. # 4
11	May 9-11	The folded dipole, matching techniques, stub matching, quarter wavelength transformer, T and gamma matches, Baluns.	9.5, 9.8	----	Prob. session # 3
12	May 16-18	Travelling wave antenna, Yagi array.	10.1-10.2, 10.3.3	Set # 6	Exp. # 5
13	May 23-25	Antenna ranges, reflection free space, amplitude pattern measurements, phase measurements.	16.1-16.3	***Major # 2***	computer assignment # 3
14	May 30-June 1	Gain, directivity, radiation efficiency, and impedance measurements.	16.4-16.7	Set # 7	Exp. # 6
15	June 6-8	Revision.		----	Lab. Exam.