

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF ELECTRICAL ENGINEERING

EE 422

ANTENNA THEORY

SECOND SEMESTER 2003/04 (032)

Instructor's name : Dr. Ahmed YAMANI

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Office hours : S.M.W. : 10:00 - 10:50 am or by appointment.

Laboratory Instructor: Mr. Umar Johar Office: 14/276

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 majors	30 %
Quizzes, & 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

Date	Topics	Text sections	HW's	Lab & Prob. sessions
February 14-18	Introduction, definitions, types of antennas, current distribution, and antenna developments.	1.1, 1.2, 1.3, 1.4, 1.5	No HW	No Lab.
February 21-25	Fundamental parameters of antennas, radiation pattern, rad. intensity, directivity, numerical techniques.	2.1-2.6	Set # 1 2.2, 2.4, 2.5, 2.8, 2.9	Introduction to the lab. No Exp.
Feb. 28- Mar. 3	Gain, efficiency, HPBW, bandwidth, polarization, input impedance, effective aperture	2.7-2.9, 2.11-2.15	Quiz #1	Exp. # 1
March 6-11	Directivity, max. effective aperture, Friis trans. formula, antenna temperature, vector potential, soln. of the inharmonic vector potential wave eqn.	2.16-2.18, 3.1-3.5	Set # 2 4.7, 4.9, 4.11, 4.15, 4.16, 4.18.	Prob. session # 1
March 13-17	Far-field radiation, duality, reciprocity, infinitesimal dipole, radiated fields, rad. resistance, directivity, small dipole.	3.6-3.8, 4.1- 4.3	Major I Mar. 15	computer assignment # 1
March 20-24	Finite length dipole, half wavelength dipole.	4.5, 4.6	Set # 3 6.1, 6.3, 6.5, 6.8, 6.16.	Exp. # 2
March 27-31	Antenna arrays, 2-element array, N element array, Broadside & endfire arrays, phased arrays.	6.1 -6.3	Quiz #2	Prob. session # 2
April 3-7	Directivity of linear arrays, linear arrays with non-uniform amplitudes, binomial array.	6.4 - 6.7	Set # 4 6.18, 6.24, 6.26, 6.34, 6.35	Exp. # 3
April 10-14	Dolph-Chebyshev arrays, self and mutual impedances of linear elements and arrays	6.7.3, 8.5	Quiz #3	computer assignment # 2
April 17-21	Input impedance of dipole, induced emf method, mutual impedance between linear elements.	8.6	Set # 5 8.11, 8.13, 8.14.	Exp. # 4
April 24-28	The folded dipole, matching techniques, stub matching, quarter wavelength transformer, T and gamma matches, Baluns.	9.5, 9.8	Quiz #4	Prob. session # 3
May 1-5	Travelling wave antenna, Yagi array.	10.1-10.2, 10.3.3	Set # 6 9.4, 9.6, 9.19,	Exp. # 5
May 8-12	Antenna ranges, reflection free space, amplitude pattern measurements, phase measurements.	16.1-16.3	Major II May 10th	computer assignment # 3
May 15-19	Gain, directivity, radiation efficiency, and impedance measurements.	16.4-16.7	Quiz #5	Exp. # 6
May 22-26	Revision.			Lab. Exam.