Wave Propagation and Antennas

Code	Credit Hours
EE-344	3-1

Course Description

This is a beginning level graduate course in electrical engineering intended for students who want to specialize in applied electromagnetics. This course presents antenna engineering concepts including in-depth studies of various antenna types, antenna arrays, computer modeling of antennas and antenna measurements.
The course starts with basic antenna theory and fundamentals. It covers antenna performance parameters, analysis of radiation from sources using Maxwell's equations, theory and design of wire antennas, arrays and printed antennas, computer methods for antenna design and antenna measurements. Students will also gain simulation experience through tutorials, assignments and projects.

Text Book:

Antenna Theory: Analysis and Design by Constantine A Balanis, Wiley, 4th edition, 2016.

Reference Book:

1. Antenna Theory and Design by Stutzman and Thiele, Wiley, 3rd edition, 2013.
2. Antennas for All Applications by Kraus, McGraw-Hill, 3rd edition, 2001.
3. Compact and Broadband Micro strip Antennas by Wong, Kin-Lu
4. Microstrip Antennas: Analysis and Design of Microstrip Antennas and Arrays, David Pozar

Prerequisites

EE-241: EMFT
EE-342: Microwave Engineering

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
ESE	50%

ASSESSMENT SYSTEM FOR LAB

Quizzes	10%-15%

Assignments	5% - 10%
Lab Work and Report	70-80%
Lab ESE/Viva	20-30%

Teaching Plan

Lecture Breakdown

Week	Topics	Sections from Textbook	Remarks
1-2	Antenna Fundamentals Antenna characterization parameters (Radiation pattern basics, Directivity and Gain, Beam width)	1.1– 1.5 2.1– 2.7	
3-4	Antenna characterization parameters (Antenna impedance, bandwidth, polarization, radiation efficiency, etc.)	2.8 – 2.18	HW # 1
5	Auxiliary potential functions	3.1 – 3.6	
6	Analysis of infinitesimal dipole antenna Small dipole antenna	4.1 – 4.3	
7-8	Half-wavelength dipole antenna Monopole and Image theory	4.4 – 4.8	HW# 2
9	**OHT**		
10	Small loop antenna Circular loop antenna with constant current	5.1– 5.3	
11	Loop antenna with non-uniform current/applications	5.4, 5.8	
12-13	Antenna Arrays Array factor for linear antennas	6.1 – 6.2	HW # 3
14	Uniformly excited, equally spaced linear arrays Array Factor, Planar arrays	6.3-6.4 6.8,6.10	
15-17	Microstrip Antennas, Antenna Measurements	14.1-14.2,17.2 – 17.4, 17.9	HW # 4
18	**ESE**		