

EC545- Advanced Antennas Systems

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2; Lab: 2

COURSE COORDINATOR

Dr. Mohammed Abou-El Dahb

TEXT BOOK

Constantine A. Balanis, "Antenna Theory : Analysis and Design," John Wiley & Sons, Inc., 2005

COURSE DESCRIPTION

Rectangular Microstrip antenna (definition, analysis, design, radiation pattern, directivity). Circular Microstrip antenna (definition, analysis, design, radiation pattern, directivity). Wideband Antenna (analysis of Spiral Antenna, Conical Antenna, Cylindrical Antenna). Helical Antenna (analysis, design, radiation pattern, directivity). Inverted F Antenna (analysis, design, radiation pattern, directivity). Log Periodic Antenna (analysis, design, radiation pattern, directivity). Analysis of Lens Antenna. Introduction to Smart Antenna.

PREREQUISITE:

EC443

RELATION OF COURSE TO PROGRAM

Elective

COURSE INSTRUCTION OUTCOMES

The student will be able to introduce students to the different antennas that used for mobile communication (for both the base station and for hand set), their parameters, and the procedures of design. These antennas are :

- Microstrip antennas (Rectangular and Circular Patch)
- Wideband Antennas (Spiral Antenna, Conical Antenna, Cylindrical Antenna).
- Helical Antenna
- Inverted F Antenna.
- Log Periodic Antenna
- Lens Antenna
- Smart Antenna

TOPICS COVERED

- Fundamental Parameters of Antennas (Radiation pattern, Directivity, Gain, Bandwidth, Beamwidth, Efficiency, and Input impedance).
- Introduction to Microstrip Antennas (Definition, Advantages, Disadvantage, Applications)

- Rectangular Microstrip Antennas (Analysis of a Rectangular Patch – transmission line Method - Radiation pattern, Directivity, Radiation resistance)
- Design procedures for rectangular microstrip antenna, Compact Rectangular Microstrip Antennas (Quarter – Wave Rectangular Patch)
- Analysis of Circular Microstrip Antennas (Using Cavity model- Radiation pattern, Directivity, Radiation resistance)
- Design procedures for circular microstrip antenna, Small circular Microstrip Antennas
- Helical (Normal And Axial Mode), Inverted F Antennas, and Planar F antenna
- Log Periodic, and Lens Antennas (analysis and design)
- Introduction to Smart Antennas

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	Engineering Topics	General Education	Other
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a ₁ a ₂
B	An ability to design and conduct experiments, analyze and interpret data.	
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	c ₂ c ₃
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e ₃
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	g ₃
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	h ₁ h ₂
I	A recognition of the need for, and an ability to engage in life-long learning.	i ₂
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	j ₂
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k