EC529- Modern Wireless Communications

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr. Ashraf Mamdouh

TEXT BOOK

Theodore Rappaport, "Wireless Communications principles and practice", Second Edition, Prentice Hall PTR, 2002

COURSE DESCRIPTION

Radio Wave Propagation - Digital Modulation Techniques - Spread spectrum techniques (DS & FH) , spreading codes - OFDM, OFDMA, SC-OFDM and their applications - Cellular systems – speech coding - Equalization & Diversity – MRC – RAKE Receiver – Channel coding : block codes, convolutional codes, and turbo codes.

PREREQUISITE:

EC 422

RELATION OF COURSE TO PROGRAM

Elective

COURSE INSTRUCTION OUTCOMES

The student will be able to:

- Understand the Theory and systems of wireless communication systems.
- Understand the WLAN concept and theory.
- Understand the Multiple access techniques.

TOPICS COVERED

- Introduction to mobile and wireless systems.
- Frequency division multiple access (FDMA), cellular concept, and 1 G mobile systems.
- multipath propagation and radio capacity of cellular systems.
- GSM and time division multiple access (TDMA) systems
- GSM transceiver and network architecture.
- code division multiple access (CDMA) concept and capacity
- spreading sequences: Walsh orthogonal codes and PN codes
- IS-95 forward link and reverse links
- High speed packet access (HSPA) evolution and WCDMA
- multicarrier and Orthogonal frequency division multiplexing (OFDM) concept
- User multiplexing in OFDM (OFDMA)

- Frequency domain model of OFDM and channel estimation
- WiMax frame structure , transmitter and receiver structures
- MIMO, diversity, and beamforming in OFDM
- Long term Evolution (LTE) physical layer

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_1 c_3
D	An ability to function on multi-disciplinary teams.	d_2 d_4
E	An ability to identify, formulate, and solve engineering problems	e_1 e_2
F	An understanding of professional and ethical responsibility	f_1
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
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