

## **EC550- Selected Topics in Communications**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr. Ashraf Mamdouh

### **TEXT BOOK**

David Tse, and Pramod Viswanath, " Fundamentals of Wireless Communication", Cambridge Press

### **COURSE DESCRIPTION**

Characteristics of Multipath Fading Channels - Principle of MCM/OFDM - OFDM as multicarrier transmission: Implementation, guard interval ( Cyclic Prefix ), Characteristics - BER in AWGN Channel -BER of CPSK-Based OFDM System in Rayleigh Fading Channels - BER in Frequency Selective and Time Selective Rayleigh Fading Channels - Optimum Number of Subcarriers and Optimum Length of Guard Interval -Applications of OFDM Digital Audio Broadcasting Terrestrial Digital Video Broadcasting - Bluetooth: Basic concepts-Protocol Architecture -Encryption & Security -Link Management -Logical link control -Ultra Wideband: Basic properties of UWB signals and systems -Generation of UWB -UWB channel modeling - UWB Communications - Modulation methods for UWB -UWB Transmitter -UWB Receiver.

### **PREREQUISITE:**

EC 422

### **RELATION OF COURSE TO PROGRAM**

Elective

### **COURSE INSTRUCTION OUTCOMES**

The student will be able to understand OFDM technique with all its aspects and DVB as an application. Bluetooth technology: Basic concepts-Protocol Architecture -Encryption & Security -Link Management -Logical link control UWB properties, generation and channel modeling and the design

### **TOPICS COVERED**

- Characteristics of Multipath Fading Channels
- Principle and History of MCM/OFDM : The concept of multicarrier transmission - OFDM as multicarrier transmission
- Implementation of OFDM by FFT - OFDM with guard interval (Cyclic Prefix)
- OFDM Characteristics : Bit Error Rate in AWGN Channel - Bit Error Rate of CPSK-Based OFDM System in Rayleigh Fading Channels

- Bit Error Rate of DPSK-Based OFDM System in Rayleigh Fading Channels - Bit Error Rate in Frequency Selective and Time Selective Rayleigh Fading Channels.
- Optimum Number of Subcarriers and Optimum Length of Guard Interval.
- Applications of OFDM: Digital Audio Broadcasting - Terrestrial Digital Video Broadcasting
- Basic concepts of Bluetooth - Protocol Architecture
- Encryption & Security of Bluetooth
- Bluetooth Link Management - Logical link control
- Simulation of a Bluetooth system
- Ultra Wideband: Basic properties of UWB signals and systems
- Generation of UWB - UWB channel modeling
- UWB Communications - Modulation methods for UWB
- UWB Transmitter - UWB Receiver

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Other</b>
	✓		

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course aspects</b>
A	An ability to apply knowledge of mathematics, science, and engineering	a <sub>1</sub> a <sub>2</sub>
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 <sub>1</sub> c <sub>2</sub>
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e <sub>1</sub> e <sub>2</sub> e <sub>3</sub>
F	An understanding of professional and ethical responsibility	f <sub>1</sub> f <sub>2</sub>
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	h <sub>1</sub> h <sub>2</sub>
I	A recognition of the need for, and an ability to engage in life-long learning.	i <sub>1</sub> i <sub>2</sub>
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	