

## **EC523- Signal space and applications**

### **CREDIT HOURS**

3 Hours

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

Lecture: 2; Tutorial: 2; Lab: 2

### **COURSE COORDINATOR**

Dr. Ashraf Mamdouh

### **TEXT BOOK**

SKLAR, BERNARD, DIGITAL COMMUNICATIONS: FUNDAMENTALS & APPLICATIONS, 2<sup>nd</sup> Edition, Prentice-Hall

### **COURSE DESCRIPTION**

Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA). OFDM, OFDMA- Examples of FDMA, TDMA, and CDMA systems, and their applications.

### **PREREQUISITE:**

EC 422

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

Required

### **COURSE INSTRUCTION OUTCOMES**

The student will be able to:

Be familiar with the spread spectrum multiple access techniques (FDMA, TDMA and CDMA techniques) and its applications. Also, to get familiar with multi-carrier techniques.

### **TOPICS COVERED**

- Introduction to Multiplexing and Multiple-access techniques in Communication Systems
- FDM and FDMA Techniques
- FDMA Performance and capacity
- Examples of FDMA Communication Systems
- TDM and TDMA Techniques
- TDMA Performance and capacity
- Examples of TDMA Communication Systems
- Spread Spectrum Techniques
- Spreading Codes- M-Sequences- Gold Codes
- CDM and CDMA Techniques
- CDMA Performance and capacity
- Comparisons of FDMA, TDMA and CDMA
- Examples of CDMA Communication Systems

- Multicarrier, OFDM and OFDMA Techniques
- Examples of OFDMA Communication Systems

**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.	b <sub>3</sub> b <sub>4</sub>
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	
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	
G	An ability to communicate effectively	g <sub>1</sub> g <sub>2</sub> g <sub>3</sub>
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	h <sub>1</sub>
I	A recognition of the need for, and an ability to engage in life-long learning.	
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.	k