

## EENG464 - Wireless Communications Systems

**Department:**

Electrical and Electronic Engineering

**Program Name:**

Wireless Communications Systems

**Program Code:** 27**Course Number:**

EENG464

**Credits:**

4

 Required Course     Elective Course**Prerequisite(s):**

EENG360,MATH322

**Catalog Description:**

Introduction to wireless communications systems. The cellular concept and system design fundamentals: frequency reuse, interference and system capacity. Radio propagation and large-scale path loss. Small-scale fading and multipath propagation: Doppler shift, mobile multipath channel parameters such as coherence bandwidth and coherence time. Diversity techniques and diversity combining. Spread spectrum communication techniques. Multiple access techniques: TDMA, FDMA, CDMA, SDMA. Current and future wireless systems and standards

**Ders Tanımı:**

Kablosuz iletişim sistemlerine giriş, Hücresel iletişim kuramı ve sistem tasarımının temelleri, frekansların yeniden kullanımı, elektriksel girişim ve sistem kapasitesi, radyo dalgası yayılımı, ve geniş-ölçekli elektromanyetik yol kaybı, küçük-ölçekli elektromanyetik solma ve çok yönlü yayılım, Doppler etkisi, bant-genişliği uyumluluğu ve zaman uyumluluğu gibi mobil çok yönlü kanal parametreleri, Sinyal çeşitlemesi ve çeşitleme birleşim teknikleri, yayılı spektrum haberleşme teknikleri, çoklu-erişim teknikleri: TDMA, FDMA, CDMA, SDMA. Güncel ve gelecek kablosuz iletişim sistemleri ve standartları.

**Course Web Page:** <http://opencourses.emu.edu.tr>**Textbook(s):**1) Wireless Communications - Principles and Practice, 2<sup>nd</sup> Edition Prentice-Hall, by Rappaport**Indicative Basic Reading List :****Course Outline:**

Week 1: Introduction to wireless communications systems.  
Week 2 -3: The cellular concept and system design fundamentals:  
Week 3-5: Frequency reuse, interference and system capacity.  
Week 5-6: Radio propagation and large-scale path loss.  
Week 7-8: Small-scale fading and multipath propagation: Doppler shift, mobile multipath channel parameters such as coherence bandwidth and coherence time.  
Week 9 : Diversity techniques and diversity combining.  
Week 10: Spread spectrum communication techniques.  
Week 11: **Mid-Term Examination**  
Week 12-13: Multiple access techniques: TDMA, FDMA, CDMA, SDMA.  
Week 14: Current and future wireless systems and standards.  
Week 15: **Final Examination**

**Course Learning Outcomes:**

A student who successfully completes the course will have the ability to:

- (a) understand the basic terminology used in Wireless Communications Systems (WCS), cellular concept and frequency re-use, system capacity, path loss, multipath, fading, Doppler effect.
- (b) Understand the basics of capacity and quality of service in Wireless Communications Systems.
- (c) use different tools and techniques for evaluating the WCS performance.
- (d) design simple WCS for small and large scale coverage.

(e) explain the difference between different generations of WCS.			
(f) understand the dynamics of radio wave propagation and path loss.			
<b>Class Schedule:</b>			
4 hrs of lectures per week			
<b>Assessment</b>	<b>Method</b>	<b>No</b>	<b>Percentage</b>
	Midterm Exam(s)	1	30%
	Project(s)	1	20 %
	Quiz(s)		10 %
	Homework(s)		5%
	Final Examination	1	35%
<b>Contribution of Course to Criterion 5</b>			
Credit Hours for:			
Mathematics & Basic Science : 2			
Engineering Design : 2			
General Education : 0			
<b>Prepared by:</b> Hasan Amca		<b>Date Prepared:</b> 14 January 2013	

**Relationship of Course to Student Outcomes**

The course has been designed to contribute to the following program outcomes:

- (1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- (2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.