

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.

Course Web Page: <http://opencourses.emu.edu.tr>, Please get the access key from the instructor through email: eeng464@emu.edu.tr

Textbook(s): 1) Wireless Communications - Principles and Practice, 2nd Edition Prentice-Hall

Indicative Basic Reading List : Web Resources

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.

Class Schedule: 4 hrs of lectures per week

	Method	No	Percentage
Assessment	Midterm Exam(s)	1	30%
	Project(s)	1	20 %
	Quiz(s)		10 %
	Homework(s)		5%
	Final Examination	1	35%

Attendance Requirement: Please note that you need to have at least 60% attendance to be eligible for taking make-up or re-sit exam.

Contribution of Course to Criterion 5

Credit Hours for:

Mathematics & Basic Science : 2

Engineering Design : 2

General Education : 0

Relationship of Course to Program 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

- 5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- 7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Contribution of Course Learning Outcomes to Student Outcomes							
Course Learning Outcome	Student Outcome:						
	1	2	3	4	5	6	7
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.	•	•					
Updated by: Hasan Amca	Date Prepared: 20 May 2021						