

EE6603: WIRELESS COMMUNICATION TECHNOLOGIES

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Wireless Communication Technologies

Subject Code

EE - Electrical Engineering

Course Number

6603

Academic Unit

Electrical Engineering (EE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

EE3008 Principles of Communications

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to provide students with an understanding of the principles of wireless communication theory, with emphasis on problem-solving techniques via discovery learning, leading to the solutions of signal and system design problems of practical wireless communication networks such as cellular networks and WiFi networks.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Describe the characteristics of fading channels and recognize the statistical modelling approach of wireless channels.		x		
2	Apply the diversity techniques to overcome fading.		x	x	
3	Explain multiple access techniques and their application in practical wireless systems.		x	x	x
4	Understand the requirements and evaluation methods and apply to practical wireless systems.		x	x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Key concepts of wireless communication theory are described and illustrated.	1, 2, 3, 4	3 hrs/wk
2	Case study	A representative network is selected as an example to demonstrate the design principles and performance evaluation techniques described in the lectures.	1, 2, 3, 4	

3	Course project	Students are encouraged to form a team and choose an advanced topic in the area of wireless communications as their course project, and present his/her findings and ideas in class. Comments on their presentations will be provided so that they could better prepare for the final project reports.	3, 4	
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Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Tests (min.: 2)	1, 2, 3, 4	30	-	No
2	Course Project	3, 4	15	-	Yes
3	Assignments (min.: 2)	1, 2, 3, 4	5	-	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

Remark: To pass the course, students are required to achieve at least 30% in course work and 30% in the examination.

Assessment Rubrics (AR)**Assessment Task**

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal level

Assessment Task

Coursework (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal level

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Medium

Marginal

(B-, C+, C) Low

Failure

(F) Not even reaching marginal level

Assessment Task

Coursework (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Achievements in CILOs

Excellent

(A+, A, A-) High

Good

(B+, B) Medium

Marginal

(B-, C+, C) Low

Failure

(F) Not even reaching marginal level

Additional Information for AR**Constructive Alignment with Programme Outcomes**

PILO 1, 2, 3,4 The course provides students with ample opportunities in acquiring knowledge of and evaluation of new wireless communication technologies, and also the applications of mathematics and engineering problem solving skills which are central to the aims of this program. Students are encouraged to develop the ability to integrate their learning into a realworld design in wireless communications.

Part III Other Information**Keyword Syllabus**Wireless channel

Fading, path loss, shadowing, flat fading, frequency-selective fading, slow fading, fast fading, delay spread, Doppler spread, coherence bandwidth, coherence time.

Diversity Time diversity, coding, interleaving, frequency diversity, time-domain equalization, OFDM, CDMA, rake receiver, space diversity, transmit diversity, receive diversity, space-time coding, beamforming.

Centralized Multiple Access

CDMA, OFDMA, TDMA, Scheduling, Cellular networks.

Random Access

Aloha, CSMA, WiFi networks.

Reading List**Compulsory Readings**

Title	
1	David Tse and Pramod Viswanath, Fundamentals of Wireless Communication Cambridge University Press, 2005.

Additional Readings

Title	
1	Andrea Goldsmith, Wireless Communications Cambridge University Press, 2005.
2	Andreas F. Molisch, Wireless Communications John Wiley & Sons Ltd, 2005.
3	Dimitri Bertsekas and Robert Gallager, Data Networks (2nd Edition), Prentice Hall, 1992.
4	Robert G. Gallager, Principles of Digital Communication Cambridge University Press, 2008.

5	John G. Proakis and Masoud Salehi, Digital Communications (5th Edition), McGraw Hill, 2005.
6	B. Sklar, Digital Communications: Fundamentals and Applications (2nd Edition), Prentice-Hall, 2001.