

EE4316: MOBILE DATA NETWORKS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Mobile Data Networks

Subject Code

EE - Electrical Engineering

Course Number

4316

Academic Unit

Electrical Engineering (EE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

EE3009 Data Communications and Networking

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

CS4284 Mobile Computing

Part II Course Details

Abstract

The aim of this course is to provide students with the knowledge of various network technologies and related protocol architectures to support mobile data communications.

Course Intended Learning Outcomes (CILOs)

| CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|---|--------|--------|--------|
| 1 | Explain the principles of cellular mobile network | x | x | |
| 2 | Evaluate the performance of cellular mobile networks | x | x | |
| 3 | Explain the design principles mobile of 802.11 WLAN | x | x | |
| 4 | Explain the design principles of new generations of mobile networks | 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 | Students will engage in formal lectures to gain knowledge in mobile telecommunication networks, and wireless local area networks. | 1, 2, 3, 4 | 3 hrs/ week |

Assessment Tasks / Activities (ATs)

| ATs | CILO No. | Weighting (%) | Remarks ("- " for nil entry) | Allow Use of GenAI? | |
|-----|------------------------|---------------|------------------------------|---------------------|-----|
| 1 | Tests (min.: 2) | 1, 2, 3, 4 | 40 | - | No |
| 2 | #Assignments (min.: 3) | 1, 2, 3 | 10 | - | 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. # may include homework, tutorial exercise, project/mini-project, presentation

Assessment Rubrics (AR)

Assessment Task

Examination

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 levels

Assessment Task

Coursework

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 levels

Part III Other Information

Keyword Syllabus

Fundamentals of Cellular Networks

Circuit Switching, Cellular Topology, Signal-to-interference ratio, FDMA, AMPS system, Capacity Expansion Techniques, Teletraffic Analysis

GSM Networks

System Architecture, Protocols, TDMA, Localization and Calling, Logical and Physical Channels

GPRS Services

Reference Architecture, Location and Handoff Management, Protocol Layers

UMTS

System Architecture, CDMA, 3.5G (HSDPA, HSUPA and HSPA)

4th Generation Systems and Beyond

System architecture, evolved packet core (EPC), OFDMA, LTE, LTE Advanced, Introduction to 5G

802.11 Wireless LAN

System Architecture, Protocol Architecture, Medium Access Control, MAC management, Security

Reading List

Compulsory Readings

| Title | |
|-------|-----|
| 1 | Nil |

Additional Readings

| Title | |
|-------|---|
| 1 | Pahlavan and Krishnamurthy: Principles of Wireless Access and Localization, (Wiley, 2013) |
| 2 | Rappaport T S: Wireless Communications: Principles and Practice, (Prentice Hall PTR, 2002) |
| 3 | Murthy and Manoj: Ad Hoc Wireless Networks: Architecture and Protocols, (Prentice Hall, 2004) |
| 4 | Dahlman: 4G LTE Advanced Pro and the road to 5G, (Academic Press, 2016) |