

# EE4316: MOBILE DATA NETWORKS

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## Effective Term

Semester A 2024/25

## 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 (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3, 4	40
2	#Assignments (min.: 3)	1, 2, 3	10

#### Continuous Assessment (%)

50

#### Examination (%)

50

#### Examination Duration (Hours)

2

**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

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**Assessment Task**

Coursework

**Criterion**

Achievements in CILOs

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

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Moderate

**Marginal (D)**

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**Failure (F)**

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## 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)