

# CS4284: MOBILE COMPUTING

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Mobile Computing

### Subject Code

CS - Computer Science

### Course Number

4284

### Academic Unit

Computer Science (CS)

### College/School

College of Computing (CC)

### Course Duration

One Semester

### Credit Units

3

### Level

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

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

CS3201 Computer Networks or  
EE3009 Data Communication Protocols or  
EE3016 WANs and Communication Protocols or equivalent

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

EE4316 Mobile Data Networks

## Part II Course Details

### Abstract

This course studies basics and emerging topics in mobile computing, including basic communication theory of wireless mobile networks as well as the software development for mobile devices. Newly-emerging areas of mobile computing involving machine intelligence and Bot will also be studied in depth. Basics of mathematical theories and algorithms for communications will be introduced for various systems such as Internet, mobile cellular networks, wireless LAN, GPS global positioning systems. Augmented reality and QR code applications will be introduced. Software development tools for mobile apps and Bot technologies in mobile devices such as smartphones and tablets will be introduced as project-based learning.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Identify the basic problems, limitations, strengths and current trends of mobile computing.		x		
2 Explain the basics and fundamentals of communication theories and algorithms in mobile wireless networks.			x	
3 Create novel applications for supporting mobile computing and communications in mobile device technologies like smartphones and tablets.		x	x	
4 Explore emerging software paradigms such as Bot in supporting mobile services with machine intelligence.		x	x	
5 Develop an attitude to solve mobile computing problems with analytical solution and software programming development for mobile devices such as mobile apps for smartphones and tablets.		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	The lectures will present selected networking technologies such as Internet, mobile cellular networks, WiFi networks, and the intuition and theory behind them. The algorithms will be illustrated with both toy and real-world examples to motivate the students' understanding. Implementation details will also be discussed.	1, 2, 3, 4, 5	3 hours/week
2	Tutorials	The students will work on problem sets during the tutorial sessions to gain better understanding of the lecture material.	1, 2, 3, 4, 5	8 hours/semester
3	Assignments	Students will implement selected mobile computing network algorithms, apply them to small test problems, and interpret the results. Students can then observe the effectiveness of the algorithm, and evaluate the differences between various algorithms.	1, 2, 3, 4, 5	2 hours/week

**Assessment Tasks / Activities (ATs)**

ATs		CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Tutorial	1, 2, 3, 4, 5	10	-	Yes
2	Midterm exam	1, 2, 3, 4, 5	10	-	No
3	Project	1, 2, 3, 4, 5	20	-	Yes

**Continuous Assessment (%)**

40

**Examination (%)**

60

**Examination Duration (Hours)**

2

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

**Assessment Rubrics (AR)**

**Assessment Task**

Tutorial

**Criterion**

Assignment may include short factual questions and design exercises regarding the various principles of mobile computing. Assignment may include simple project / exercises. There would also be hands-on exercises.

**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**

Midterm Exam

**Criterion**

The mid-term quiz will include questions assessing the students' understanding on networking and mobile computing.

**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**

Project

**Criterion**

There would be hands-on and case study on network design in the project. Tasks may include mini programming project.

**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**

Final Exam

**Criterion**

The final exam and mid-term quiz will include questions assessing the students' understanding on mobile computing.

**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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## Part III Other Information

**Keyword Syllabus**

Mobile computing. Wireless communications and networks. Mobile Cellular networks. Wireless LAN. Medium access control. Wireless network power control algorithms. Augmented reality and QR code applications. Software development tools for mobile devices. Software programming of mobile apps and Bots.

Syllabus

- Basic issues in mobile computing: Fundamentals of computing and communications. Mathematical analysis of communications theory. Latest development and current trends of mobile computing.
- Networking technologies: The Internet. Mobile/wireless TCP. Wireless LAN. IEEE 802.11 protocol and algorithms.
- Mobile communications: Wireless communication theories. Multiple Access such as FDMA, CDMA and TDMA. Wireless cellular network optimization. Cell design and area planning for cellular networks. Sensor technologies on mobile computing devices.
- Mobile computing: Clocks in mobile applications. GPS global positioning systems.
- Mobile computing: QR Code applications. Augmented-reality applications. Machine intelligence and Bots.

- Mobile computing: Mobile app software programming. Software development tools and devices. Bot software programming. Mobile software development for project-based learning

## Reading List

### Compulsory Readings

Title	
1	Mischa Schwartz, Mobile Wireless Communications 1st Edition, Cambridge University Press, 2005

### Additional Readings

Title	
1	David Holber, Hal Abelson, Ellen Spertus and Liz Looney. App Inventor, O' Reilly Media, 2014, 2nd edition. Online resources: <a href="http://appinventor.mit.edu">http://appinventor.mit.edu</a>
2	William Stallings. Wireless Communications & Networks. Pearson, 2nd edition.