

**City University of Hong Kong  
Course Syllabus**

**offered by Department of Computer Science  
with effect from Semester B 2016/17**

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**Part I Course Overview**

**Course Title:** Mobile Computing

**Course Code:** CS5284

**Course Duration:** One semester

**Credit Units:** 3 credits

**Level:** P5

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites:** CS5222 Computer Networks and Internets or  
(Course Code and Title) EE5412 Telecommunication Networks or equivalent

**Precursors:** Nil  
(Course Code and Title)

**Equivalent Courses:** Nil  
(Course Code and Title)

**Exclusive Courses:** Nil  
(Course Code and Title)

## Part II Course Details

### 1. Abstract

This course studies emerging topics in mobile computing and networking, including basic communication and networking, architectures and technologies of wireless and mobile networks, software development for mobile devices and newly-emerging areas of mobile computing. Mobile communication theories, algorithms and architectures will be introduced involving wireless cellular networks, mobile TCP, wireless LAN, and mobile device technologies such as smartphones and tablets. Mathematical analysis of mobile computing algorithms will be conducted in depth. Software development tools of mobile apps will be introduced and basic project-based learning related to the software development of mobile apps will be conducted. Newly-emerging mobile applications that capitalize mobile computing and cloud computing will be discussed in details.

### 2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Describe the issues and problems in current trends of mobile computing.		✓		
2.	Create novel mechanisms and systems for supporting mobile computing and communications including wireless communication architectures, mobile/wireless TCP and wireless LAN, wireless cellular networks and mobile device technologies like smartphones and tablets.		✓	✓	✓
3.	Explore the strengths and limitations of different types of mobile/wireless networks.		✓		
4.	Explain the mechanisms for supporting mobility including mobility management, multimedia communication in cellular networks and wireless networks.		✓		
5.	Analyze the performance of different frequency reuse and resource allocation algorithms for wireless cellular networks.		✓		
6.	Explore the problems in supporting mobile services.		✓	✓	✓
7.	Explore the characteristics of mobile ad hoc networks and analyze the performance of power control algorithms for mobile/wireless networks.		✓		
8.	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.		✓	✓	✓
		100%			

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 self-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.

**3. Teaching and Learning Activities (TLAs)**

(TLAs designed to facilitate students' achievement of the CILOs.)

Teaching pattern:

Suggested lecture/tutorial/laboratory mix: 2 hrs. lecture; 1 hr. tutorial.

TLA	Brief Description	CILO No.								Hours/week (if applicable)
		1	2	3	4	5	6	7	8	
Lecture	Regular lecture on theories and algorithms of mobile computing	✓	✓	✓		✓				
Homework Assignments	Two homework based on theories and algorithms related to mobile computing	✓		✓	✓		✓	✓		
Course Project	Project-based learning that consists of a final report submission and demo of mobile computing project	✓	✓	✓	✓	✓	✓	✓	✓	

**4. Assessment Tasks/Activities (ATs)**

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.								Weighting	Remarks
	1	2	3	4	5	6	7	8		
Continuous Assessment: 40%										
Homework assignment	✓		✓	✓		✓	✓		10%	
Course project	✓	✓	✓	✓	✓	✓	✓	✓	15%	
Midterm examination	✓	✓	✓	✓					15%	
Examination <sup>^</sup> : 60% (duration: 2 hours)	✓	✓	✓	✓	✓	✓	✓	✓		
									100%	

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

## 5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Adequate (C+, C, C-)	Marginal (D)	Failure (F)
Course project	Able to provide novel ideas and working demo	If a working demo is shown in class	If final report writing has some good ideas and attempt	If weak attempt in final report writing	If feeble attempt in final report writing	If no attempt in final report writing
Homework assignment	Able to solve math problems	If a solution with complete workings including program is shown	If final solution is correct with correct workings	If weak attempt	If feeble attempt	If no attempt
Midterm examination	Able to solve math problems	If final solution is correct with correct workings	If final solution is correct with correct workings	If weak attempt	If feeble attempt	If no attempt
Examination	Able to solve math problems	If final solution is correct with correct workings	If final solution is correct with correct workings	If weak attempt	If feeble attempt	If no attempt

### Part III Other Information (more details can be provided separately in the teaching plan)

#### 1. Keyword Syllabus

*(An indication of the key topics of the course.)*

Mobile computing. Wireless communications and networks. Multiplexing methods. Cellular networks. Cell design and frequency reuses. Mobility management. Telecommunication systems and architectures. Wireless LAN. Medium access control. Mobile/wireless TCP. Wireless power control algorithms. Software development for mobile devices.

1. Basic issues in mobile computing: Limitations and characteristics of mobile networks. Mathematical analysis of communications and networking. Development tools and devices. Latest development and current trends of mobile computing.
2. 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. Frequency reuses and channel designs.
3. Networking technologies: The Internet, Telecommunication systems. Wireless LAN. IEEE 802.11 protocol. Carrier Sense Multiple Access (CSMA) protocol theory and algorithm.
4. Wireless cellular network and architectures: 2G, GPRS and 3G/4G networks, and current trends of mobile communications. System components and architectures.
5. Communication protocols: Mobile/wireless TCP. Media access control. TCP congestion control algorithms for multimedia sensing and mobile ad hoc networks.
6. Mobile device technology: Mobile app programming, QR Code applications, mobile software development for project-based learning

#### 2. Reading List

##### 2.1 Compulsory Readings

*(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)*

1.	Mischa Schwartz, <u>Mobile Wireless Communications</u> 1 <sup>st</sup> Edition, Cambridge University Press, 2005
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##### 2.2 Additional Readings

*(Additional references for students to learn to expand their knowledge about the subject.)*

1.	William Stallings, <u>Wireless Communications &amp; Networks</u> , 2 <sup>nd</sup> Edition, Pearson
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