

**City University of Hong Kong**

**Information on a Course  
offered by Department of Computer Science  
with effect from Semester A in 2012 / 2013**

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**Part I**

**Course Title:** Mobile Computing

**Course Code:** CS5284

**Course Duration:** One Semester

**Credit Units:** 3

**Level:** P5

**Medium of Instruction:** English

**Prerequisites:** CS5222 Computer Networks and Internets or  
EE5412 Telecommunication Networks or equivalent

**Precursors:** Nil

**Equivalent Courses:** Nil

**Equivalent to the Old Course Code & Title:**  
IT5701 Mobile Computing

**Exclusive Courses:** Nil

## Part II

### Course Aims

This course aims at discovery of a comprehensive and important issues in mobile computing and communications. The topics are grouped into four main areas: basic issues and problems, mobile and wireless networks, mobile/wireless communication architectures and related communication protocols. The problems in mobile computing comparing with computing in fixed network systems will be explained. Different mobile communication architectures will be introduced including smart phone technology. Wireless networks such as 2G/3G/4G networks and protocols such mobile/wireless TCP, wireless LAN, Mobile Ad-hoc networks, multimedia sensor networks and mobility management strategies that are needed to support mobile computing will be discussed. Mobile ad hoc networks will be also studied.

### Course Intended Learning Outcomes (CILOs)

*Upon successful completion of this course, students should be able to:*

No.	CILOs	Weighting (if applicable)
1.	describe the basic 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; multimedia sensor networks and mobile ad-hoc networks;	
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 handoff, roaming, and location update algorithms for cellular networks;	
6.	explore the problems in supporting mobile services including data dissemination, data caching and positioning;	
7.	explore the characteristics of mobile ad hoc networks and analyze the performance of different routing and power-saving algorithms for mobile/wireless networks.	
8.	develop an attitude to propose solutions with comparisons	

	for problems related to mobile computing through investigation of different protocols and mobile/wireless networks.	
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### Teaching and Learning Activities (TLAs)

*(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)*

Teaching pattern:

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

CILO No.	TLAs	Hours/week (if applicable)
CILO 1 to CILL 8	The concepts and techniques of mobile computing systems will be covered in the lectures. The tutorials provide an opportunity for the students to discuss and deepen their understanding of materials learnt during the lectures. Case studies and assigned readings are used to identify the trends and latest development of the technologies in the area. A series of tests/assignments, aimed at helping with the students' learning the concepts, approaches and techniques, will be offered. The test and assignment results will also serves as feedbacks so that the lecturer can pace the presentations accordingly. Some wireless web-based teaching tools will be used (such as WiFiLab developed at CityU, Anyserver Lab) to explore the interconnection and performance behaviour and performance of wireless LAN and mobile networks and related computing algorithms and transmission protocols. In the process, the students will be given opportunity to interactively interact with the tools and doing the experiment anywhere anytime with convenience.	

### Assessment Tasks/Activities

*(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)*

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)	Remarks
CILO 1 to CILO 8	The course ILOs will be expected to be accessed using both examination and coursework including report writing and assignments through design and test-bed experiments.  Report writing on selected topics can be used as a measure on the understandings of the students on the basic concepts, design issues and techniques in mobile computing		

	(ILOs 1-7). Considering the students are on the master level or above, presentation assessment will be arranged to ask the students to present their views of learning and design of modern mobile computing and system (ILOs 1-8).		
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**Grading of Student Achievement:** Refer to Grading of Courses in the Academic Regulations for Taught Postgraduate Degrees.

*Examination duration:* 2 hours

*Percentage of coursework, examination, etc.:* 40% CW; 60% Exam

*Grading pattern:* Standard (A+AA-...F)

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

### Part III

#### Keyword Syllabus

Mobile computing. Wireless communications and networks. Multiplexing methods. Cellular networks. Cell design and frequency reuses. Mobility management. Roaming and handoff. Location updates, paging and call connection. Telecommunication systems and architectures. Wireless LAN. Medium access control. Mobile/wireless TCP. Signal quality measurement. Smart phones technology and power control algorithms. Multimedia sensor and ad hoc networks. Energy-efficient routing algorithms.

#### Syllabus

1. Basic issues in mobile computing: Supports for mobile communications and mobile computing. Limitations and characteristics of mobile networks. Development tools and devices. Balance between performance, energy-efficiency and quality of services. Latest development and current trends of mobile computing.
2. Mobile communications: Wireless transmission. Coding schemes and multiplexing. FDMA, CDMA and TDMA. Multipath propagation. Cell design and area planning for cellular networks. Frequency reuses and channel designs.

3. Wireless networks: Telecommunication systems and basic cellular networks. Wireless LAN. IEEE 802.11. Ad hoc networks and sensors.
4. Cellular network and architectures: 2G, GPRS and 3G/4G networks, and current trends of mobile communications. System components and architectures. Handoff, roaming and mobility management. Call registration and connection.
5. Communication protocols: Mobile/wireless TCP. Media access control. Routing algorithms for multimedia sensing and mobile ad hoc networks.
6. Smart phone technology, power control algorithm and signal quality.

### **Recommended Reading**

#### *Essential Text*

*Jochen Schiller, Mobile Communications, Second Edition, Addison Wesley*

#### *Supplementary Readings*

*William Stallings, Wireless Communications & Networks, 2<sup>nd</sup> Edition, Pearson*

*Yi-Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architecture, Wiley*

#### Online Resources