

City University of Hong Kong

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

Part I

Course Title: Pervasive Computing System

Course Code: CS5289

Course Duration: One Semester

Credit Units: 3

Level: P5

Medium of Instruction: English

Prerequisites: CS5222 Computer Networks and Internets or equivalent

Precursors: Nil

Equivalent Courses: Nil

Exclusive Courses: Nil

Part II

Course Aims

This course aims is to introduce the characteristics, basic concepts and systems issues in pervasive computing, and to provide an opportunity for students to understand the emerging technologies and issues in a pervasive computing system.

Course Intended Learning Outcomes (CILOs)

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

No.	CILOs	Weighting (if applicable)
1.	discover the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and quality of services, major system components and architectures of the systems;	
2.	discover the basic problems, performance requirements of	

	pervasive computing applications, and the trends of pervasive computing and its impacts on future computing applications and society;	
3.	analyse the strengths and limitations of the tools and devices for development of pervasive computing systems;	
4.	explore the characteristics of different types of mobile networks on the performance of a pervasive computing system;	
5.	investigate the basic techniques and algorithms for designing pervasive computing systems including context-aware computing, management of temporal and sensor data and real-time scheduling;	
6.	analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications;	
7.	analyze the performance of different sensor data management and routing algorithms for sensor networks;	
8.	develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.	

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 CILO 8	The concepts and techniques of pervasive 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 are used to identify the trends and latest development of the technologies in the area. A series of test/assignments, aimed at helping with the students' learning the concepts, approaches and techniques, will be offered. The test and assignment results will also serve as feedbacks so that the lecturer can pace the presentations accordingly. Students will be requested to explore the design a pervasive	

	systems using pervasive network lab and related algorithms and protocols will be explored. The students will be requested to demonstrate their design work on the pervasive system in related to system devices, architecture, protocols and performance improvements.	
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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	<p>The course ILOs will be expected to be accessed using both examination and coursework including report writing and assignments and design or programming assignment. The students are also required to handle in some tutorials as the mini-assignments.</p> <p>Project based assignments are used to measure the understandings of the students about the characteristics and limitations of the development tools for pervasive computing devices (ILOs 3-8).</p> <p>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 pervasive computing systems (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 a novel pervasive system (ILOs 1-8).</p> <p>Examination can be used as an overall measure of the understandings of the students on the algorithms, techniques and performance issues discussed in the lectures (ILOs 1 - 8).</p>		

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

Software architecture and technologies for pervasive computing, cellular networks and positioning, mobile computing devices, RFID technology and applications, location-dependent services, moving objects and location management, data dissemination, context-aware computing, temporal consistency, sensor devices and sensor data management, real-time embedded and surveillance systems, sensor networks and routing algorithms.

Syllabus

A framework for pervasive computing will be presented during the lectures, with discussion of the following issues and the techniques to resolve these issues:

1. Basic issues in pervasive computing: support for context-awareness, smart devices, adaptive services and transparent interaction, balance between performance, energy-efficiency and quality.
2. Mobile Device Technology: energy profiling and power-aware computing, embedded systems and intelligent agents, self-adaptive systems, cellular networks, sensors and sensor networks.
3. System and database technologies: location management and positioning, context-aware modelling, temporal consistency and real-time data management, push and pull techniques for data dissemination, stream and location update processing, in-network processing and sensor query processing, routing algorithms, surveillance and real-time scheduling.
4. Case studies of current projects and pervasive computing systems to identify their strengths, limitations and the future directions: Smart Home, Smart camera networks, etc.

Recommended Reading

Text(s)

PRINTED MATL c2011

Pervasive computing and communications design and deployment : technologies, trends and applications / [edited by] Apostolos Malatras

PRINTED MATL 2011

Pervasive computing and networking / Mohammad S. Obaidat, Mieso Denko, Isaac

Woungang (eds.)

PRINTED MATL c2010

*Strategic pervasive computing applications : emerging trends / Varuna Godara
[editor]*

PRINTED MATL c2010

*Designing solutions-based ubiquitous and pervasive computing : new issues and
trends / [edited by] Francisco Milton Mendes Neto, Pedro Fernandes Ribeiro Neto*

*M. Satyanarayanan, "Pervasive Computing: Vision and Challenges", IEEE Personal
Communications, August, 2001.*

*K. Edwards and R. Grinter, "At Home with Ubiquitous Computing: Seven
Challenges", Proc. Ubiquitous Computing 2001.*

*J. Hightower and G. Borriello, "Location Systems for Ubiquitous Computing", IEEE
Computer, Aug. 2001.*