

*Syllabus – Spring 2007*

## **Mobile and Pervasive Computing Services**

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### **Background:**

With around 3 billion mobile phone users worldwide, including several hundred million mobile Internet users, new wireless and pervasive computing services are changing the way enterprises interact with both their customers and their employees. The explosion in smart phone ownership, the adoption of faster wireless standards, and the emergence of different location tracking technologies are but a few factors contributing to the development of a slew of new services. These include mobile commerce services, mobile social software services, enterprise applications all the way to more futuristic pervasive computing services.

### **Objective:**

The objective of the course is to introduce participants to the technologies, services and business models associated with Mobile and Pervasive Commerce. It also provides an overview of future trends and ongoing research in this new and fast growing area.

### **What You Will Learn:**

Students who take this course will **learn to evaluate critical design tradeoffs** associated with different mobile **technologies, architectures, interfaces** and **business models** and how they impact the **usability, security, privacy** and **commercial viability** of mobile and pervasive computing services.

### **Topics Include**

Mobile Communication and Mobile Internet technologies, Mobile and Wireless Security, Mobile Development Environments, Mobile Commerce Applications (e.g. mobile banking, mobile ticketing, mobile payment, mobile infotainment, etc.), location tracking and location-based services, mobile social software, RFID, mobile enterprise and mobile government applications, context awareness, pervasive computing.

### **Projects**

Students enrolled in the 9-unit section of the course are expected to complete a team project

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## Course Approach/Philosophy

The course's approach is one that emphasizes "learning by sharing" and "learning by doing", with a substantial percentage of a student's grade being based on a project to be defined jointly with the instructor (9-unit section only)

## 6-unit vs 9-unit sections

- 6-unit section: Includes homework assignments & one class presentation
- 9-unit section: Class project – including final report and project presentation

Both sections share the same lectures and same midterm and final exams

## Grading

### 9-Unit Format

- Closed Book Midterm: 25%
- Close Book Final Exam: 25%
- Project: 50%
- Class Participation is taken into account when computing final letter grades

### 6-Unit Format

- Student Presentation: 20%
- Closed Book Midterm: 25%
- Close Book Final Exam: 25%
- Homework assignments: 30%

**Class Participation is taken into account when computing final letter grades**

## Important Note on Recording and Videotaping

- Videos of lectures prepared by Carnegie Mellon personnel will be made available online to students a few days after each lecture. These videos are for use only by students enrolled in the course and are not to be copied or made available to others.
- Please note that if you ask questions in class they will likely be captured on video. If you do not feel comfortable having your questions recorded, please talk to the instructor about other possible arrangements.
- No student may record or tape any classroom activity without the express written consent of the instructor

## Lectures

***Meeting Times: Tu-Th: 10:30-11:50am (NSH 1305)***

***Lecture 1: Course Summary and Objectives*** (Jan 16)

- Objectives of the course
- Context and Trends: The Forces Behind Mobile and Pervasive Commerce
- A first look at i-Mode

***Lecture 2& 3: Mobile Communications*** (Jan 18, Jan 23)

- A managerial overview of 2G, 2.5G, 3G technologies and beyond
- A managerial overview of WiFi (IEEE802.11), WiMax, NFC, etc.
- Student Presentation: WiMAX (Jan 23)

**Lecture 4: Mobile Internet Technologies** (Jan 25)

- Mobile Internet Challenges
- Mobile IP, IPv6, etc.
- A managerial overview of WAP2.0
- The role of Java
- Usability Considerations
- Student presentation – Mobile TV

**Lecture 5: Mobile Internet Programming** (Jan 30)

- WAP
- J2ME
- VoiceXML/X+V
- SALT
- Student Presentation: Mobile Operating Systems

**Lecture 6: Mobile Internet Security & Mobile Payments** (Feb 1)

- Mobile Internet Security Challenges
- GSM/GPRS/UMTS SIM-based security
- WAP security: WIM, WTLS/TLS, WMLScript SignText()
- J2ME Security
- Mobile Payment solutions today, including contactless solutions
- Student presentation – Bluetooth, Zigbee and UWB

**Lecture 7: Developing Usable Mobile Applications and Services & Openness of the Mobile Internet** (Feb 6)

- Usability Issues
- User-Centered Design
- How Open is the Mobile Internet?
- A managerial overview of 3GPP's service architecture and other service oriented architectures
- Student presentation – Social implications of pervasive computing

**Lecture 8 :Mobile Commerce & Mobile Enterprise Applications Today** (Feb 8)

- Mobile Portals, Mobile Infotainment Services, Mobile Ticketing, Mobile Banking, Mobile Advertising, Mobile e-Tailing, Mobile TV, etc.
  - Including a close look at prevailing and emerging business models
- A Closer look at i-Mode and other successful services
- Multi-channel strategies
- Google's Mobile Strategy
- Mobile enterprise applications
- Student presentations – Comparison of Several mobile devices

**Lecture 9: Midterm Exam** (Feb 13)

**Lecture 10 : Mobile Commerce & Mobile Enterprise Applications Today- Continued** (Feb 15)

- Continuation of Lecture 9
- Student presentations – SOA for Mobile and Pervasive Computing

### ***Lecture 11 : Location-Sensitive Services*** (Feb 20)

- Overview of positioning/location tracking technologies
- Overview of Location-Based Services (LBS)
  - Services, Technologies and Business Models
- Student presentation – A Selection of Location Based Services

### ***Lecture 12 and 13: Future Mobile & Pervasive -Commerce Services*** (Feb 22 & 27)

- Context Awareness
- Privacy Issues
- MyCampus: Reconciling Context-Awareness and Privacy
- Overview of Ongoing Pervasive Computing Efforts in Industry and Academia
- Mobile & Pervasive Commerce: Future Prospects
- Student Presentation (Feb 22) – Software Radios
- Student Presentation (Feb 27) - 4G Standard Development

### ***Lecture 14 & 15: Final Project Presentations*** (March 1 & 6)

- **25 minutes per team, including prototype demonstration and Q&A**

### **FINAL PROJECT REPORTS due by midnight on Thursday March 8, 2007**

- **Late submission policy (Project Report & Homework Assignments):** 10% of the grade deducted per late day (e.g. submission of the final project report by 12:01am on Friday March 9 is considered one day late)...**Don't be late!**

## **Office Hours**

- **Norman Sadeh:** Tu-Th: 3-4pm (Smith 227)
  - **No office hours on Tu Jan 30 and Tu Feb 13.**
  - **Policy:** first-come, first served except for people with appointments. For appointments, please contact Jennifer Lucas ([jmlucas@cs.cmu.edu](mailto:jmlucas@cs.cmu.edu)).
  - **Plan on meeting with me every other week about your project for 20 minutes.**
  - **Plan on showing me your class presentation a few days before the lecture**
- **Mikhael Felker:** Mo-Wed 1:30-2:30pm (location: CIC2206)

## **Communication**

- Use blackboard to submit your final project report
- Presentation proposals and project proposals (including team composition) should be emailed to the TA
- General questions should be emailed to the TA. If he can't answer them, he will forward them to the instructor