**Course Title: Mobile Cloud Computing**
**Date: 8/18/2014**


## Suggested Bulletin Course Description

Introduction to the basic concepts of mobile cloud computing, including: 1. The mobile computing technology used in modern smart phones; 2. The cloud computing technologies used in existing data centers; 3. The synergy of mobile and cloud computing and its applications; 4. Programming on android smart phone utilizing data center services. Students will gain knowledge of: the fundamental principles of mobile cloud computing, the major technologies that support mobile cloud computing, the current challenges and primary areas of research within the field of mobile cloud computing, and a basic understanding of the role of mobile cloud computing in the context of the everyday living.

**Prerequisites: ESE 224** or **CSE230 (Introduction to Programming in C and C++)**. The course assumes a basic understanding of programing and software, but critical elements such as operating systems will be reviewed in this course.

Spring 2015

Stony Brook University

Department of Electrical & Computer Engineering

College of Engineering and Applied Sciences

Course Title: Mobile Cloud Computing

Course Instructor: Prof. Shan Lin

## Instructor and Office Hours

Instructor: Shan Lin

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Office Hours: TBD

Location: TBD

Time: TBD

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## LEARNING OBJECTIVES

At the end of this course, students will:

1. Understand the evolution of computing paradigm in the past decade
2. Understand the basic multicore architecture on modern smart phone platform
3. Know how to program smart phones to utilize its computing resources
4. Understand the basic data center structure and their computing process
5. Know how to write a program to access cloud resources
6. Understand supporting technologies on the smart phones
7. Understand standards of existing technologies and their challenges
8. Know how to access and control these technologies
9. Understand the distinct and complementary features of the mobile and cloud computing
10. Understand the underlying principles of mobile cloud applications
11. Know how to design, simulate, and program mobile cloud applications
12. Understand the economic impact and technological issues relevant to mobile cloud computing applications, and know how to measure, analyze, and evaluate such applications with real systems.

The learning objectives 7, 8, 11 are tailored for graduate students and not enforced to undergrads.

## COURSE REQUIREMENTS

*Attendance and Make Up Policy*

Late work will not be accepted. Attendance at all exams is mandatory. In the case of 1) verifiable illness, 2) verifiable family emergency, 3) University-sanctioned religious holiday, or 4) participation in official University-sponsored events (for documented student athletes only), excuse must be documented on official letterhead (as appropriate) and will be verified by the instructor.

## Textbook and Reading

Raj Kamal. Mobile Computing. Oxford University Press. 2007.

Frank H. P. Fitzek, Marcos D. Katz . Mobile Clouds: Exploiting Distributed Resources in Wireless, Mobile and Social Networks. Wiley Press. 2013.

Other readings for this course will be in the form of research papers, which will be distributed to students online.

## Topics and semester schedule

| Week | Topics |
|---|---|
| Week 1<br>Lecture 1 | 1. What is the trend of computing paradigms?<br>2. Why mobile cloud computing?<br>3. Overview of the mobile cloud computing technologies |
| Week 1<br>Lecture 2 | Mobile cloud computing platforms |
| Week 2<br>Lecture 1 | Applications and System specifications 1 |
| Week 2, Lec 2 | Applications and System specifications 2 |
| Week 3, lec 1 | Mobile computing principles<br>Platforms and challenges to existing systems |
| Week 3<br>Lecture 2 | Android programming and simulation |
| Week 4<br>Lecture 1 | Mobile computing multi-core architecture 1 |
| Week 4, Lec 2 | Mobile computing multi-core architecture 2 |
| Week 5, Lec 1 | Cloud computing principles<br>Existing data center systems |

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| Week 5, Lec 2 | Virtualization of computing resources |
| Week 6, Lec 1 | File systems and operating systems for data center |
| Week 6, Lec 2 | Cloud computing services |
| Week 7 Lecture 1 | Cloud computing programming |
| Week 7, Lec 2 | Real-time virtualization for cloud computing |
| Week 8, Lec 1 | Synergy of mobile and cloud computing |
| Week 8, Lec 2 | Midterm Exam |
| Week 9 Lecture 1 | Underlying Technologies: heterogeneous wireless communication and its impact on mobile cloud computing paradigm |
| Week 9 Lecture 2 | Underlying Technologies: localization and location based cloud services |
| Week 10 Lecture 1 | Underlying Technologies: sensing and activity recognition with mobile cloud |
| Week 10 Lecture 2 | Underlying Technologies: real-time scheduling |
| Week 11 Lecture 1 | Programming with sensing and location services |
| Week 11 Lecture 2 | Energy and traffic management for mobile cloud computing I |
| Week 12 Lecture 1 | Energy and traffic management for mobile cloud computing II |
| Week 12 Lecture 2 | Human in the loop control with mobile cloud computing I |
| Week 13 Lecture 1 | Human in the loop control with mobile cloud computing II |
| Week 13 Lecture 2 | Privacy and Security |
| Week 14 Lecture 1 | Data processing and knowledge creation |

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| Week 14<br>Lecture 2 | Review of mobile cloud computing technologies, economic impact and technological issues |
| Week 15 | Final project presentation |

## Grading

Your grade will be based on attendance, paper reviews (written and oral), programming assignments, a midterm exam, and the final project.

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| Attendance and participation | 10% |
| Paper reviews | 15% |
| Programming assignments | 15% |
| Midterm exam | 20% |
| Final project | 40% |

Undergrad and graduate will be evaluated with different standards on midterm exam, lab assignment, and final project. For graduate, there will be 2-3 extra questions in midterm exam, and one extra task in each programming assignment. As to the final project, graduate student needs to complete a system with both mobile and cloud computing elements and demonstrate their interactions. Undergrads don't need to design specifically for the mobile and cloud computing tradeoffs.

## Disability

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, 128 ECC Building (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following web site: http://www.ehs.sunysb.edu and search Fire Safety and Evacuation and Disabilities.

## Honor Policy

- All exams, homework, and project assignments are subject to this Honor policy. This means that placing your name on an exam or an assignment implicitly pledges that

you abided by the terms of this policy.

- The homework assignments are to be done alone. Any malpractice (e.g., reporting fraudulent data, copying another student's solution, plagiarism) will be treated as an Honor Code violation.
- For the project, collaboration with other people or groups is allowed, but collaboration does not mean copying each others' solutions. Such collaboration should be limited to discussing concepts. You must understand the project that you turn in and be able to explain and defend it.

Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/