

## **Syllabus**

### **1. Course Staff and Office Hours**

Instructor: Shan Lin

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Office Location: Light Eng. 249

Office Phone: 631-632-8398

Office Hours: Wed 1:30 PM - 3 PM or by appointment

Location: MELVILLE LBR N3074

Time: Wed 3:30 PM - 6:30 PM

*Hours may change. Please check Blackboard for most up-to-date information. Room numbers are in the Light Engineering building.*

### **2. Course Description**

As computers and communication bandwidth become ever-faster and ever-cheaper, computing and communication capabilities will be embedded in all types of objects and structures in the physical environment. Applications with enormous societal impact and economic benefit will be created by harnessing these capabilities in time and across space. We refer to systems that bridge the cyber-world of computing and communications with the physical world as cyber-physical systems (CPS). This course covers important areas from the research literature on CPS. Three application domains are emphasized: medical devices for health care, smart transportation systems, and smart buildings. Several key cross-cutting principles, independent of the application domain, are also covered, including formal modeling, embedded systems, real-time systems, feedback control, and sensor networks.

*Prerequisite:* Background in operating systems and computer networking is necessary.

3 credits.

### **3. Course Objective**

By the end of this course, students will have an understanding of the cyber physical systems and the corresponding important research challenges in this area. More specifically, one objective is to learn the current state of art in CPS domain. CPS is multi-disciplinary with the need for new underlying principles. Another objective is to learn

details regarding several necessary principles required for future CPS. A third objective is improving critical reading, presentation, and research skills.

Students will demonstrate this knowledge through written paper reviews, an oral paper presentation, and a final course project.

## 4. Reading

### Textbook:

*Introduction to Embedded Systems - A Cyber-Physical Systems Approach*, by E. A. Lee and S. A. Seshia, 2014. The book is available in two forms: a free PDF download and low-cost paperback.

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

## 5. Topics

1. Cyber Physical System Introduction
2. CPS Applications and Systems
3. Sensors and Actuators for Physical Processes
4. System Modeling, Model based Design, and Timed-Automata
5. Real-time Scheduling with Resource-constrained Platform
6. Feedback Control for Computing Systems
7. Networked System Composition

## 6. Grading

Your grade will be based on attendance, paper reviews (written and oral), paper presentations, and projects.

Paper reviews and discussions	10%
Paper presentations	30%
Final project	60%

## 7. Schedule

Classes will be held in on Wed every week except for the week of Thanksgiving.

A full schedule with topics, reading assignments, presentation, and due dates will be available on Blackboard.

## 8. 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.

## **9. 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/>