SE-630 Real-Time Systems Analysis and Specification

Fall 2010

Location: HH 316 Time: T 1:00 – 3:45PM

Instructor

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- Office Hours: Monday 3:00-5:00pm, other time by appointment

Course Objectives

Real-time systems are systems that must produce their results within specified time intervals. Examples of real-time systems are flight control programs, air traffic control systems, control systems for nuclear power plants, patient monitoring systems, military command and control systems, and telecommunication systems. Real-time systems are playing a more and more important role in our daily life. Even our safety depends on their correctness.

This course is designed to provide students with the theoretical foundations and practical algorithms in the specification and validation of real-time systems and applications. It covers some most important topics such as real-time system modeling, scheduling, resource access control, multiprocessor synchronization and real-time communication.

Required Textbook

Jane W.S. Liu, Real-time systems, NJ: Prentice Hall, ISBN: 0130996513, 2000.

Course Work

There will be 5 homework assignments, a midterm exam and a final exam.

All homework must be typed. Handwritten papers will not be accepted. In-class exams may be neatly handwritten.

The midterm exam is scheduled for October 26, and the final term exam is scheduled for December 21. Both are taken during course hours and open-book.

A research paper which surveys one of the hottest research topics in the area of real-time embedded systems.

Grading

Homework	40%
Research paper	15%
Midterm test	20%

Final exam 25%

Class Participation

Class participation is strongly recommended. If you miss a class, it is your responsibility to find out what is covered and what announcements are made in the class.

Withdrawal

Last date to withdraw with automatic assignment of a "W" grade, Tuesday November 9, 2010.

Academic Honesty

Everything you turn in for grading must be your own work. Academic dishonesty subverts the University's mission and undermines the student's intellectual growth. Therefore, we will not tolerate violations of the code of academic honesty. Penalties for such violations include suspension or dismissal and are elaborated upon in the Student Handbook.

Special Accommodations:

Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor or the appropriate disability service provider on campus as soon as possible. In order to receive accommodations, students must be registered with the appropriate disability service provider as set forth in the student handbook and must follow the University procedure for self-disclosure, which is stated in the University Guide to Services and Accommodations for Students with Disabilities. Students will not be afforded special accommodations for academic work done prior to completion of the documentation process with the appropriate disability service office.

Tentative Course Contents

WK1 (09/07) Introduction to Real-Time Systems
WK2 (09/14) Overview of Operating Systems
WK3 (09/21) Reference Model for Real-Time Systems
WK4 (09/28) Clock-Driven Scheduling
WK5 (10/05) Priority-Driven Scheduling of Periodic Tasks
WK6 (10/12) Priority-Driven Scheduling with Non-Preemptable Tasks
WK7 (10/19) Scheduling Aperiodic Jobs in Priority-Driven Systems
WK8 (10/26) Review and Midterm
WK9 (11/02) Scheduling Sporadic Jobs in Priority-Driven Systems
WK10 (11/9) Resource and Resource Access Control
WK11 (11/16) Preemption-Ceiling Protocols
WK12 (11/30) Multiprocessor Scheduling
WK13 (12/07) Real-Time Communication
WK14 (12/14) Real-Time Operating Systems, Review
WK15 (12/21) Final Exam