

CE 6308 / CS 6396 / EE 6308: Real-Time Systems

Syllabus: Spring, 2009

**Please note:** Please look at the course schedule and catalogue for information on withdrawals, incompletes, and academic honesty.

**Instructor:** Farokh B. Bastani

1. *Office hours:* Tuesday/Thursday, 11:30 a.m. - 12:30 p.m.
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**Pre-requisite.**

1. CS 5348 (Operating Systems Concepts) or equivalent.

**Reading material.**

1. Text/Recommended/Reference books:
  - (a) J.W.S. Liu, *Real-Time Systems*, Prentice Hall, 2000 (or later).
  - (b) A.M.K. Cheng, *Real-Time Systems: Scheduling, Analysis, and Verification*, Wiley Interscience, 2002 (or later).
  - (c) H. Kopetz, *Real-Time Systems: Design Principles for Distributed Embedded Applications*, Kluwer Academic Publishers, 1997 (or later).
  - (d) Q. Li with C. Yao, *Real-Time Concepts for Embedded Systems*, CMP Books, 2003 (or later).
  - (e) B.P. Douglass, *Real-Time Design Patterns: Robust Scalable Architecture for Real-Time Systems*, Addison-Wesley, 2003 (or later).
2. On-line references, including conference and journal papers.

**Catalogue Description.**

1. Introduction to real-time applications and concepts;
2. Real-time operating systems and resource management;
3. Specification and design methods for real-time systems;
4. System performance analysis and optimization techniques, task assignment and scheduling;
5. Real-time communication;
6. Case studies of real-time operating systems.

**Topics.** The course will cover the following topics:

1. Overview of real-time applications and concepts with emphasis on the distinguishing characteristics of real-time systems and the constraints that they must satisfy.
2. Real-time scheduling and schedulability analysis, including clock-driven and priority-driven scheduling.
3. Specification and design methods for real-time systems, including verification using timed automata and timed petri nets, model checking, real-time temporal logic specifications.
4. Resource management in real-time systems, including potential problems and their resolution as well as practical issues in building real-time systems.
5. Real-time communication (if time permits).

There will be projects related to process-control or communication systems. These will be group projects.

**Evaluation.** Cheating, plagiarism, collusion, and falsifying academic records will not be tolerated and will result in an "F" grade on the course. The tests and the exam are open notes. However, you must not discuss the questions and/or answers with anyone else nor copy or look at anyone else's answers nor seek help with the tests or exam from anyone in any way.

There are no make-up dates for missed examinations. Late assignments will not be accepted.

1. Three examinations: 70% of the overall grade.
2. Group projects: 30%. The projects will target applications in process-control or telecommunication systems. The projects will include design/implementation/analysis of some systems along with corresponding documentations and term papers.