

## COURSE DESCRIPTION

**Department and Course Number:** COMP 6720

**Course Title:** Real Time and Embedded Systems

**Total Credits:** 3

**Required:** No

**Prerequisites:** COMP 3500

**Class meetings per week:** 3 hours

**Lab meetings per week:** 0 hours

**Course Coordinator:** Dr. Sanjeev Baskiyar

**Date Prepared:** February 18, 2004

### **Current Catalog Description:**

Concepts of real-time and embedded computer systems. Studies of real-time algorithm issues such as timeliness, time-constrained scheduling and communication. Embedded system issues such as limited memory, low power, and high latency communication

### **Textbooks:**

Burns, A. and Wellings, A. 2003. *Real-time Systems and their Programming Languages*. Pearson Education. ISBN 0-201-72988-1.

Laplante, P. 1997. *Real-time Systems Design and Analysis, An Engineer's Handbook*. IEEE Press. ISBN 0-7803-3400-0.

### **References:**

Selected current conference and journal articles.

### **Course Objectives:**

1. Be able to systematically design real-time and embedded systems.
2. Be able to match programming techniques for the problem at hand.
3. Be able to program real-time and embedded systems while meeting temporal and resource constraints.

### **Prerequisites by Topic:**

1. Operating systems
2. Processes scheduling
3. Resource management
4. Security

### **Topics Covered:** (specify number of hours on each)

1. Characteristics, issues and examples of real-time systems (3 hours)
2. Methodologies for design, implementation and testing (6 hours)
3. Software engineering of real-time and embedded systems (6 hours)
4. Reliability and fault tolerance techniques (6 hours)
5. Exception handling (3 hours)
6. Concurrent programming (3 hours)

7. Introduction to scheduling (3 hours)
8. Real-time kernels (3 hours)
9. Real-time memory management (3 hours)
10. Inter-task communications (3 hours)
11. Wireless embedded systems (3 hours)
12. Exams (3 hours)

**Laboratory Projects:** (specify number of weeks on each)

Develop a heuristic algorithm (and simulate its performance) to dynamically schedule a set of tasks connected as a directed acyclic graph to meet temporal and resource constraints (7 weeks).

**Oral and Written Communications:**

All students are required to apply their documentation skills as part of the course design projects.

**Social and Ethical Issues:**

None.

**Theoretical Content:**

None.

**Problem Analysis and Solution Design:**

All students apply fundamental software engineering practices to analyze, design, implement, test, and document solutions to all assignments. Students apply the analysis and design skills already acquired to the development of software components for real-time systems. Each component has stated requirements and students are responsible for applying a controlled, iterative process for developing a solution that meets the desired needs and satisfies specified constraints.