COURSE DESCRIPTION

Department and Course Number: COMP 5720
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: Spring 2010

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:
Laplante, P. 2004. *Real-time Systems Design and Analysis,* 3rd edition, IEEE Press and Wiley Interscience. ISBN 0-471-22855-9.

References:
- Burns, A. and Wellings, A. 2009. *Real-time Systems and Programming Languages*, 4th edition, Addison Wesley. ISBN 978-0-321-41745-9.
- 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. Exams (5 hours)

Laboratory Projects: (specify number of weeks on each)
Develop an algorithm to schedule a set of tasks to meet temporal, resource, and energy constraints. Simulate the performance of the algorithm and compare it with other techniques. (6 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:
Fundamentals of real-time programming techniques are presented in focused lessons (6 hours) and then applied as appropriate throughout the course.

Problem Analysis and Solution Design:
All students apply fundamental software engineering practices to analyze, design, implement, test, and document solutions to all assignments.