CSCE 4620/5620 – Real-Time Operating Systems

Fall 2017

Class Hours & Location:	Tuesday and Thursday, 11:30am-12:50pm, NTDP B190
Class Website:	Blackboard
Instructor:	Dr. Song Fu
Office:	NTDP F250
Office Hours:	Tuesday and Thursday, 10:00am-11:00am, or by appointment
Contact:	song.fu@unt.edu; (940) 565-2341
Instructional Assistant:	Sharmila Gottimukkula
IA Office:	Help Lab
IA Office Hours:	Monday and Wednesday, 11:00am-12:00pm
IA Contact:	SharmilaGottimukkula@my.unt.edu
Textbooks:	*Real Time Concepts for Embedded Systems* by Qing Li CRC Press, 2003. ISBN: 1-578220-124-1
	Recommended Readings:
	Real-Time Systems by Jane W. S. Liu Prentice Hall, 2000. ISBN: 0-13-099651-3
	Operating System Concepts (9th Ed.) by Abraham Silberschatz Wiley, 2012. ISBN: 1-11-806333-3
Prerequisites:	CSCE 3600: Principals of Systems Programming

Course Objectives:

This course is about the design of real-time operating systems. We will learn basic real-time operating systems concepts and services, including interrupt processing, process and thread models, real-time software architectures and development environments. We will also study in details the design and implementation of real-time applications using real-time operating systems. Commercial real-time operating systems/development environments, including FreeRTOS, will be discussed in case studies. The outcomes of this course are:

- Understand the differences between general purpose and real-time operating systems.
- Understand multithreading in real-time environment.
- Understand task and thread scheduling in real-time operating systems.
- Understand memory management in real-time system.

- Be able to program using system proved timers, signals, mutual exclusion, semaphores, message queues and exception handlers.
- Be able to program real-time applications to run in a realistic operating environment.

Tentative Schedule:

Week 1 Introduction to real-time systems and OSes
Week 2 RTOS services, real-time tasks
Week 3-5 Periodic, aperiodic and sporadic tasks scheduling
Week 6 FreeRTOS
Week 7 Review, midterm exam
Week 8-9 RTOS memory management
Week 10 Exceptions and interrupts, timers
Week 11 Signals and communication
Week 12 Semaphores and synchronization
Week 13-14 RTOS design issues, FreeRTOS applications
Week 15 Review, final exam

Grading:

10% - Attendance and class participation;
30% - Homework, programming assignments, and quizzes;
30% - Midterm and final exams;
30% - Project.

Every student is expected to attend all lectures, read the assigned reading before class, and participate in class discussions.

Late Policies:

Assignments are due before class on the due date. Late assignments will be penalized 10% per day, up to 3 days. No credit will be given after 3 days. Please try to finish your assignments on time.

Cooperation & Academic Honesty:

Each homework and lab assignment must be worked on individually. A submission carries with it an implicit statement that the submission is your own work. You may discuss the requirements and syntactical issues, but not solutions or designs. Violations may result in failure of the course.

Disability Policy:

The Computer Science Department and this instructor cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you will require accommodation please discuss with me after class and present a written accommodation request on or before the 2nd week of class.