CSCE 4620/5620 – Real-Time Operating Systems
Fall 2020

Class Hours & Location:	Tuesday and Thursday, 1:00pm-2:20pm, NTDP B140
Class Website:	Canvas

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:	Xu Ma
IA Office:	Help Lab (F232)
IA Office Hours:	Monday and Wednesday, 9:00am-10:00am
IA Contact:	XuMa@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 (10th Ed.) by Abraham Silberschatz
Wiley, 2018. ISBN: 1-11-945633-9

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 Robot Operating System (ROS), 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 Robot Operating System (ROS)
	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, ROS 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.