

Syllabus
EE 4710 –Real-Time Embedded Systems
Fall 2014

Description: An advanced course on real-time embedded system design. Topics include task concurrency, scheduling paradigms, synchronization, resource access control, and inter-process communication. Lecture and Lab combination.

Rationale: Real-time systems are prevalent today and the ability to design and use real-time systems makes an engineer more marketable.

Coordinator: Dr. Fon Brown, 626-7781 (Office), Room ET 236B

Office Hours: Office hours are posted at <http://faculty.weber.edu/fonbrown>

E-mail: fonbrown@weber.edu

Time and Location: 9:00-10:15am MW, Module 2 Room 100 (North side).

Prerequisite: EE3710.

Credits: 4.

Text: Liu, Real Time Systems, Prentice Hall.

Supplies: C8051F020DK development kit with CDs.

Student Learning Outcomes: The students will be able to:

1. Describe the characteristics of a real-time system.
2. Write multi-threaded real-time applications.
3. Use synchronization primitives.
4. Control access to resources shared by multiple threads.
5. Design applications with cooperative threads.
6. Determine whether a set of tasks is schedulable.

Student Assessment:

Homework	20%
Laboratory Exercises	20%
Midterm Exams (2)	40%
Final Exam	20%

Grading: Letter grades (A-E) are assigned according to the tables below:

From	To	Grade
100%	93%	A
93%	90%	A-
90%	87%	B+
87%	83%	B
83%	80%	B-

From	To	Grade
80%	77%	C+
77%	73%	C
73%	70%	C-
70%	60%	D
60%	0%	E

Reading: A reading assignment may be given in the course schedule or assigned in class. Students are expected to read the material prior to the class period for which it is assigned.

Homework: Homework will be assigned in class or through CANVAS and be due at the beginning of class two class periods later (excluding exam days). Late homework is accepted until the next exam but is penalized 20%.

Laboratory Exercises: Laboratory exercises will be assigned as needed and are due at the end of the lab period unless announced otherwise. Late work is accepted until the time of the final exam with a 20% penalty. The Laboratory period is 1:30-4:30 Mondays in room ET 127.

Exams: Midterm exams will be given around the 5th and 10th week of the semester. The final exam is comprehensive and is scheduled for 9:30am Monday, December 8. Exam material is taken primarily from lecture material but may also include material covered in the reading assignments. If the instructor cannot attend an exam or if the university is closed, the exam will be rescheduled or administered through the testing center. No make-up exams are given, but if a student cannot attend an exam, he or she may request to take it early.

Attendance: Attendance is neither taken nor required. If the instructor cannot attend a lecture or if the university is closed, class will be canceled and may or may not be rescheduled.

Services for Students with Disabilities: Any student requiring accommodations or services due to a disability must contact Services for Students with Disabilities (SSD) in Room 181 of the Student Services Center. SSD can also arrange to provide course materials (including the syllabus) in alternative formats if necessary.

Tentative Schedule

Date	Reading	Lecture
8/25		Syllabus, What is Real-time, Real-time applications
8/27	2.1-3.3	Timing Constraints, Hard v. Soft, Periodic, Aperiodic & Sporadic Tasks.
9/1		Labor Day
9/3	3.4-3.9	Precedence and data dependencies
9/8	4.1-4.6	Common Scheduling techniques. EDF, LST
9/10	4.7-4.9	Problems with EDF, LST. Online v. offline scheduling.
9/15	5.1-5.9	Clock Driven Approaches
9/17	6.1-6.4	RM and DM scheduling
9/22	6.5-6.8	Schedulability of RM and DM approach
9/24		Review
9/29		Exam 1 – Chapters 2-6
10/1	7.1-7.4	Deferrable, Sporadic and Fair-Queuing Servers
10/6	7.5-7.6	Slack Stealing algorithms
10/8	7.7-7.9	Scheduling sporadic jobs
10/13	8.1-8.3	Non-preemptive critical sections
10/15	8.4	Priority Inheritance Protocol
10/20	8.5-8.7	Priority Ceiling Protocol
10/22	8.8	Preemption Ceiling Protocol
10/27	8.10-11	Access Control for Resource and Data objects
10/29		Review
11/3		Exam II
11/5		TBA
11/10		TBA
11/12		TBA
11/17		TBA
11/19		TBA
11/24		TBA
11/26		TBA
12/1		TBA
12/3		Review