

The University of Texas at Tyler
Department of Electrical Engineering

EENG 5336: Real Time Systems

Syllabus

Catalog Description:

Basic Real-Time Concepts; Computer Hardware; Languages; Real-Time Kernels; Intertask Communication and Synchronization; Real-Time Memory Management; The Software Life Cycle; System Performance Analysis and Optimization; Reliability, Testing, and Fault Tolerance; Hardware/Software Integration; Integrated lab experiments with state-of-the-art real-time hardware and software tools. Graduate level term project or paper.

Prerequisites: EENG 3307 or CI

Credits: 3 (0 hours lecture, 0 hours laboratory per week)

Text(s): Mukul Shirvaikar and Theodore Elbert, **Fundamentals of Real Time Systems**, Cognella Academic Publishing, San Diego, CA, 2017. ISBN 978-1-5165-0189-2, 978-1-5165-0188-5

Additional Material: ARM Board and Development Tools

Course Coordinator: Mukul V. Shirvaikar, Professor

Topics Covered: (paragraph of topics separated by semicolons)

Basic Real-Time Concepts; Computer Hardware; Languages; Real-Time Kernels; Intertask Communication and Synchronization; Real-Time Memory Management; The Software Life Cycle; System Performance Analysis and Optimization; Reliability, Testing, and Fault Tolerance; Hardware/Software Integration; Integrated lab experiments with state-of-the-art real-time hardware and software tools.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes¹: By the end of this course students will be able to:

1. Apply real time and embedded systems concepts including requirements, complexity, tasks, and deadlines [1,4,5]
2. Utilize modern tools to implement hands-on projects with real time systems [1,4,5]
3. Predict real time systems reliability using advanced scheduling techniques, e.g. Rate Monotonic Analysis, worst-case latency, etc. [1,5].

4. Understand real time operating systems, kernels, software design, inter-task communications, and memory management [1,4,5]
5. Implement and debug real time systems projects using various design methods such as cyclic executives, round-robin thread switching, preemptive tasks with priorities, etc.[1,3]
6. Describe the impact of real time systems on society. [1]

¹Numbers in brackets refer to method(s) used to evaluate the course learning outcomes.

Relationship to Student Outcomes (only items in dark print apply)²: This course supports the following Electrical Engineering Student Outcomes, which state that our students will:

1. **Breadth and Depth:** Students will be able to apply knowledge at a graduate level in two of the following areas: electronics, power systems, controls, advanced engineering mathematics, signal processing, communications, real-time systems, computer systems, electromagnetic and power electronics. [1]
2. **Modern Engineering Tools:** Students will be able to use modern engineering tools for analysis and design as applied to engineering problems. [2]
3. **Advanced Engineering Mathematics:** Students will be able to apply principles of advanced engineering mathematics including probability and statistics to engineering problems. [3]
4. **Systems Design:** Students will be able to apply systems design approaches including modeling and simulation of interacting sub-systems to complex engineering problems. [4]
5. **Design Methods:** Students will be able to demonstrate application of design methodology by comparing and evaluating solutions to engineering problems.[5]
6. **Communication Skills:** Students will demonstrate effective oral, visual and written communication skills from a technical perspective. [6]

²Numbers in brackets refer to course objective(s) that address the Student Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Grade Replacement:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

Prepared By: Mukul Shirvaikar, Professor

Date: 17 July 2014
28 August 2016
23 August 2018