

CSE321: REAL-TIME AND EMBEDDED OPERATING SYSTEMS (4 Credits, Required)

Catalog Description

Addresses some of the fundamental challenges in the design, implementation, and validation of these real-time and embedded systems. Topics include resource management, concurrency, secure coding practices, memory management, timeline design and analysis using metrics and schedulability tests, hardware interfacing, device driver programming, memory maps and boot kernels, firmware and ROM-resident system code, communications and networking, and debugging live systems. These concepts will be reinforced through C programming assignments using the RTLinux operating system.

Prerequisites

Prerequisites: CSE341 or permission of instructor

Corequisites: None

Textbook(s) and/or other required material

Philip Laplante. (2004). Real-time Systems Design and Analysis, 3rd Edition, Wiley InterScience publishers.

Course Objectives

On completion of this course students will be able to (i) understand the components and working of a realtime and embedded operating systems and (ii) design and implement various embedded operating system functions.

Topics Covered

Hardware fundamentals

CPU hardware

Memory

Input/output

Real-time operating systems

Theoretical foundations of real-time operating systems

Realtime operating systems case studies

Embedded XINU

Performance analysis

Faults, failures and bugs

Kalman filter, probing and patching, system integration

Firmware and Rom resident execution strategies

Class / Lab Schedule

Three 50-minute lectures per week

One 50-minute recitation per week

Contribution of course to professional component/criterion 5

Engineering Topics: 4 credits

Engineering Design

Relationship of course to program outcomes

This course is required of all computer engineering students and has a significant relationship with the following program objectives for computer engineering:

- (i) A recognition of the need for an ability to engage in lifelong learning.
- (j) A knowledge of contemporary issues.

This course has a strong relationship with the following program objectives for computer engineering:

- (e) An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles.
- (k) An ability to use the techniques, skills, and modern hardware and software engineering tools necessary for computer engineering practice.

Persons who prepared this description and date of preparation

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