EEL 6894

Real-Time Computing and Applications

Section: U01

In Person

Spring Term 2026

Course Meeting Information

Time: Monday 2 pm - 4:45 pm

Location: EC 1113

Date: Jan 5th - April 18th, 2026

Professor Information

Gang Quan

Roles: Primary Instructor

Email: gaquan@fiu.edu

Phone: 3053482808

Office Hours: By appointment

Office Location: EC3911

Department or Academic Unit: Electrical and Computer Engineering

Course Prerequisites

Course prerequisites, if any, are listed below.

Course Description

This graduate course provides a comprehensive exploration of the principles and practices underlying real-time systems, where correctness is contingent upon both the logical soundness and the timeliness of computational outcomes. The curriculum is structured in two complementary segments: a foundational lecture series and a research-oriented seminar. The lecture component establishes core theoretical concepts, including temporal constraint modeling, schedulability analysis, and single/multi-processor scheduling algorithms. The seminar component transitions to contemporary research and application, where students will engage in critical analysis of literature and conduct a semester-long research project, culminating in a formal presentation and a technical report adhering to IEEE conference proceedings standards.

Textbook and Course Materials

N/A

Required/Recommended: N/A

Authors: N/A

Publisher: N/A

Publication Date: N/A

Copyright Date: N/A

ISBN 10: N/A

ISBN 13: N/A

Chapters/Pages: N/A

Readings, Materials, and Open Educational Resources (OER)

The lectures will be substantially based on technical papers from literature, most of which can be found from online databases such IEEE eXplore and ACM digital library (accessible online in FIU campus). Students are responsible to print and read related papers.

Course Goals

The primary goal of this course is to equip students with the theoretical foundation and analytical skills required to design, analyze, and evaluate real-time computing systems. Students will achieve mastery over classical and advanced scheduling paradigms, understand the implications of resource sharing and multi-core architectures, and explore emerging challenges in domains such as power and thermal management. A key objective is to bridge theory and practice by fostering the ability to critically assess research literature and to execute a rigorous research project from problem formulation to final documentation.

Student Learning Outcomes/Objectives

- **Explain the differences between real-time systems and other computing systems and understand the challenges in the design of such systems.**

- **Analyze and apply fundamental real-time scheduling algorithms (e.g., Rate Monotonic, Earliest Deadline First) and perform schedulability analysis for**

task sets on single and multiple processor platforms.

- **Model and evaluate the impact of shared resources, power, and thermal constraints on system schedulability and performance.**

- **Synthesize and communicate research findings by conducting an in-depth investigation of a contemporary topic, effectively presenting results, and producing a scholarly, publication-quality project report.**

Expectations of the Course

Students are expected to:

- **be self-motivated and self-discipline;**
- **introduce yourself to the class during the first week;**
- **review the getting started page located in the course modules;**
- **interact with instructor and peers and engaging in the discussions actively;**
- **complete and submit the assignment by the due date specified, no late work will be accepted.**

Assignments & Assessments

This course assesses student learning through a written examination, a research topic presentation, a semester-long project, and active class participation.

Written Exam

This will be an open-book, open-notes exam designed to evaluate students' conceptual understanding of the fundamental principles of real-time systems and

applications, rather than rote memorization.

Research Topic Presentation and Report

Students will explore a specific area of interest within real-time systems through a literature survey and analysis. While this can be an individual endeavor, collaborative work in small teams is strongly encouraged. The process is as follows:

- **Topic Selection: Students/groups must select a research topic and submit a one-page written proposal for timely approval by the instructor.**
- **Presentation: Students/groups will deliver a 25-30 minute presentation to the class on their chosen topic, summarizing key concepts and insights from their research.**
- **Final Report: A formal written report, conforming to the IEEE conference proceedings format, must be submitted to document the findings of the literature survey.**

Semester-Long Research Project

This project provides an opportunity for students to conduct deeper investigation, which may include implementing algorithms, running simulations, or performing theoretical analysis. Teamwork is strongly recommended. The project requirements are:

- **Proposal: A project proposal must be submitted for approval, outlining the research objectives, methodology, and expected outcomes.**
- **Presentation: Students/groups will deliver a 25-30 minute presentation covering the project's motivation, background, methodology, and key findings.**
- **Final Paper: A comprehensive research paper, written in the IEEE**

conference proceedings format, is required. This paper should detail the project's contributions and results.

Participation and Attendance

Active and informed participation is a crucial component of this course. Students are expected to attend all sessions and contribute meaningfully to class discussions and Q&A sessions following presentations. As part of the learning process, students will complete peer-evaluation forms for presentations, which will be factored into the overall participation grade.

Grading

Course Grades Distribution Table

Course Requirements	Weigh
Written Exam	35%
Topic Research	20%
Semester-long Project	35%
Participation/attendance	10%
Extra Credit(Surveys)	2%
Total	102%

Letter Grade Distribution Table

Letter Grade	Sample Range %
A	90 to 102
A-	89 to 90-
B+	88 to 89-
B	80 to 88-
B-	79 to 80-
C+	78 to 79-

Letter Grade	Sample Range %
C	70 to 78-
D	60 to 70-
F	0 to 60-

Schedule of Topics

The main topics include:

- **Introduction of real-time systems and the role of scheduling**
- **Single processor scheduling: rate monotonic scheduling, earliest deadline first**
- **Single processor scheduling with resource sharing**
- **Optimization methods for constrained optimization problems**
- **Multiple processor scheduling and design optimization**
- **Power/Thermal-aware real-time scheduling**

Canvas Schedule

Due Date	Assignment Name	Assignment Type	Points
	Academic Honesty Policy	Quiz	0
	General Forum	Discussion	0
	Participation/Discussions/Attendency	Assignment	10
	Topic of Research Report	Assignment	100

Due Date	Assignment Name	Assignment Type	Points
1/11/26	Pre-class survey	Quiz	10
1/18/26	Introduce Yourself	Discussion	100
2/22/26	Proposal for Topic of Research	Assignment	100
3/9/26	Topic of research (presentation)	Assignment	100
3/15/26	Midterm Survey	Quiz	10
3/26/26	Peer-Review Topic Research	Quiz	10
3/27/26	Final Project Proposal	Assignment	100
4/9/26	Final Project (presentation)	Assignment	100
4/12/26	Exam	Assignment	100
4/16/26	Final Project Report	Assignment	100
4/16/26	Peer-Review Final Project	Quiz	10
4/19/26	Post-class survey	Quiz	10

Policies & Resources

Before starting this course, please review the Policies & Resources Page in Canvas, which includes comprehensive information on various University and Course Level Policies such as:

- **University Policies**
- **Accessibility and Accommodations**
- **Online Etiquette**
- **Technical Requirements and Skills**
- **Computer & Digital Literacy Skills**
- **Course Technology Accessibility Statements and Privacy Policies**
- **Academic Integrity**
- **Copyright Statement**
- **Nondiscrimination Statement**
- **Panthers Care & Counseling and Psychological Services (CAPS)**
- **Fair Use Policy**

Nondiscrimination Statement

The **Office of Civil Rights Compliance and Accessibility** (CRCA) is responsible for ensuring that FIU maintains a workplace and learning environment free from discrimination, where current and prospective faculty, staff, and students are treated equitably. If any student, employee, or applicant has a sincere and reasonable belief that they have been discriminated against or harassed based on age, color, disability, marital status, ethnic or national origin, race, religion, retaliation, sex, or any other protected category, they can report their concerns to the CRCA team through report.fiu.edu.