EEL 4740

Embedded Computing Systems

Section: RVC

Internet/Fully Online

Spring Term 2026

Course Time Zone: Eastern Time (ET). Course due dates and times are according to this time zone.

Professor Information

Dr. Gang Quan

Roles: Primary Instructor

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Office Hours: By appointment

Office Location: EC3911

Department or Academic Unit: Electrical and Computer Engineering

Course Prerequisites

Course prerequisites, if any, are listed below.

Prerequisite: EEL4709C

Course Description

Embedded systems are application-specific and processor-based electronic systems. Such systems have now been deeply ingrained in our daily lives, ranging from simple household appliances to transportation systems and many medical, communication, recreation, and entertainment products. Today, embedded system design is a multi-billion-dollar business. The course will provide fundamental knowledge and hands-on experience for embedded system hardware and software development.

This course will consist of three modules. The first module will introduce foundational concepts associated with embedded system design. The second will focus on completing a series of labs, targeting different aspects of embedded system design. The third module will conclude the course with a final project and a written exam. Module availability is open. The lab will be individual work, but the final project will be completed in groups. Communication will take place primarily via Canvas Inbox and professor announcements.

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

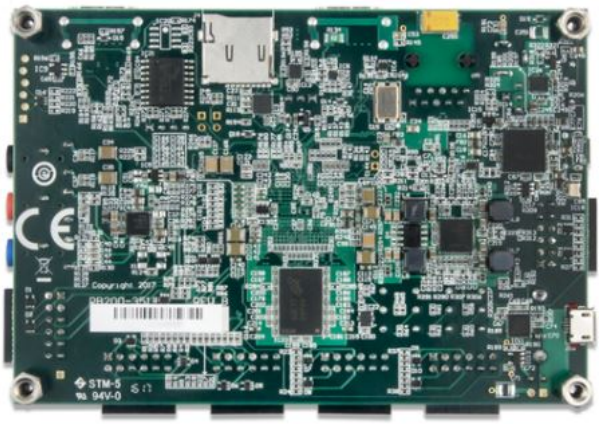
Panther Book Pack

Get all required course materials for $20.50 per undergrad credit hour through Panther Book Pack. You'll be charged automatically unless you opt out within 3 days after the add/drop deadline.

For more details, to compare costs, and to learn how to access your course materials, visit the Panther Book Pack information page on FIU OneStop.

Readings, Materials, and Open Educational Resources (OER)

Zybo Z7-20 Zynq-7000 ARM/FPGA SoC Development Board (Required)



This course demands a significant amount of lab work. The lab projects are developed based on Zybo Z7-20 Zynq-7000 ARM/FPGA SoC development board.

Each enrolled student will be provided a Zybo Z7-20 Zynq-7000 ARM/FPGA SoC Development board free of charge, which needs to be intact and returned to the department by the end of the semester. Details regarding pick up and return will be provided in the course during the semester.

Xilinx Vivado Design Suite WebPack (Required)

Please download the Xilinx Vivado Design Suite 2017.4

The electronic design automation software tools used for this course can be downloaded online for free to a personal computer with Windows or Linux operating system.

Mastering the FreeRTOS (Recommended)

FreeRTOS is an open-source software that students need to conduct labs. It can be downloaded at no charge.

Author: Richard Barry

Download online at FreeRTOS

Student Learning Outcomes/Objectives

- **Explain the differences between the embedded system with the general-purpose computing system, its design challenges, and design methodologies;**

- **Describe the major hardware components and their characteristics in embedded system design;**

- **Describe the embedded software cross-platform design environment and working flow;**

- **Classify different hardware/software interaction strategies, communication protocols, and discuss their pros and cons;**

- **Design and program both hardware and software components and their interfaces for embedded systems using electronic design automation tools and reconfigurable hardware platform;**

- **Use embedded system operating system for implementing and managing multitasking in embedded system design;**

- **Recognize the significance of power issues in embedded system design and explain the existing methodology to deal with these issues.**

Expectations of this Course

This is an online course, which means most (if not all) of the course work will be conducted online. Expectations for performance in an online course are the same as a traditional course. In fact, online courses require a degree of self-motivation, self-discipline, and technology skills which can make these courses more demanding for some students.

Students are expected to:

- **review the getting started page located in the course modules;**

- **introduce yourself to the class during the first week by posting a self-introduction in the appropriate discussion;**
- **take the practice quiz to ensure that your computer is compatible with the learning management system, Canvas;**
- **interact online with instructor and peers;**
- **review and follow the course calendar and weekly outlines;**
- **log in to the course five times per week;**
- **respond to discussions by the due date specified. No late work will be accepted;**
- **respond to emails within two days;**
- **submit assignments by the corresponding deadline.**

The instructor will:

- **log in to the course five times a week;**
- **respond to emails within 24 hours on M-F;**
- **grade assignments and/or provide feedback within two weeks of the assignment deadline.**

Assignments & Assessments

Quizzes:

- This course includes quizzes in which students will answer multiple-choice, fill-in-the-blank, essay, and true/false questions.
- The exact times and dates of availability will be posted in the course.

- The durations for the quizzes vary from 10 minutes to 45 minutes.
- Two attempts are permitted and the highest score is recorded. Students should assess their performance in the first attempt and review the content covered in the quiz before starting the second attempt.
- Late submissions and makeup quizzes are not permitted without valid and documented excuse and prearranged with the instructor.

Lab Assignments:

- Students will apply foundational concepts presented in the first module by following instructions provided with each lab assignment and using a Digilent Development Board.
- Students will form a group to work on the lab assignment, but each person must complete the lab assignments and submit the demonstration videos and reports individually.
- NO late submission is permitted without the prior arrangement with the instructor.
- Please see the lab assignment rubric posted in the course for grading .
    - A video link (Youtube) showing that the design system functions as required
    - The written lab report
    - Contents: Discussions, figures/tables, questions/answers
    - Format: grammar, neatness, completeness

Final Project:

- Students will design and develop a fully functional embedded system on the Digilent Zybo Z7-20 board using Xilinx Vivado development tools;
- The project consists of two graded parts, the proposal and report.
- Students will form a group and submit a proposal for their project for approval. Each group will submit a final report to document their project.
- NO late submission without the prior arrangement with the instructor.
- The final project rubric posted in the course will be used for grading.
    - Proposal
    - Project report

Written Exam:

- This course includes one written exam in which students will answer multiple-choice, fill-in-the-blank, true/false, essay, and upload questions.
- The exact time and date of availability will be posted in the course at least one week before the deadline.
- Late submissions and makeup exams are not permitted without valid and documented excuse and prearranged with the instructor.
- The exam will be closed book.

Introduce Yourself and Survey:

- Students will post their course self-introduction in this forum using the guidelines posted within the first week of class
- Three surveys (pre-class, mid-class, post-class) will be launched in the class and students have opportunities to obtain extra credits to participate in the surveys.

Grading

Course Grades Distribution Table

Course Requirements	Number of Items	Points for Each	Total Points Available	Weight
Quizzes	6	100	600	20%
Lab Assignments	9	100	900	40%
Final Project	1	110	110	20%
Exam	1	100	100	20%
Extra Credit	4	NA	NA	2%
Total	21	—	NA	102%

Letter Grade Distribution Table

Letter Grade	Sample Range %
A	91 to 100
A-	90 to 91-
B+	89 to 90-
B	81 to 89-
B-	80 to 81-
C+	79 to 80-
C	70 to 79-
D	60 to 70-
F	0 to 60-

Proctored Exams

Please note that the information contained in this section applies only if your course requires a proctored exam.

Through a careful examination of this syllabus, it is the student's responsibility to determine whether this online course requires proctored exams. Please visit our Student Proctored Exam Instructions webpage for important information concerning proctored exams, proctoring centers, and important forms.

Schedule of Topics

The topics include

- The principles of embedded computing and challenges.
- Processors, memory, and other embedded hardware components.
- Hardware/software interfacing.
- I/O devices and communication protocols.
- Embedded software development and working flow.
- Embedded operating systems.
- System design techniques.
- Power awareness in embedded system design.

Canvas Schedule

Due Date	Assignment Name	Assignment Type	Points
	Academic Honesty Policy	Quiz	0
	Academic Honesty Policy	Quiz	0
	Open Forum	Discussion	0
	Open Forum	Discussion	0
	Practice Quiz	Quiz	0
	Practice Quiz	Quiz	0
1/18/26	Enrolled in a lab group	Assignment	0
1/18/26	Introduce Yourself	Discussion	100
1/18/26	Pre-class survey	Quiz	20
1/25/26	Lab 1	Assignment	100
1/25/26	Quiz 1	Quiz	100
1/25/26	Quiz 2	Quiz	150
1/25/26	Quiz 3	Quiz	100
2/1/26	Lab 2	Assignment	100
2/1/26	Quiz 4	Quiz	150
2/8/26	Lab 3	Assignment	100

Due Date	Assignment Name	Assignment Type	Points
2/9/26	Quiz 5	Quiz	150
2/9/26	Quiz 6	Quiz	150
2/17/26	Lab 4	Assignment	100
2/22/26	Lab 5	Assignment	100
3/8/26	Lab 6	Assignment	100
3/15/26	Lab 7	Assignment	100
3/15/26	Midterm Survey	Quiz	10
3/22/26	Enrolled in a final project group	Assignment	0
3/22/26	Lab 8	Assignment	100
3/29/26	Final Project Proposal	Assignment	10
4/5/26	Lab 9	Assignment	100
4/19/26	Written Exam	Quiz	100
4/19/26	Post-class survey	Quiz	15
4/23/26	Final Project Report	Assignment	100

Course Communication

Communication in this course will take place via **the Canvas Inbox**. Check out the Canvas Conversations Tutorial or Canvas Guide to learn how to communicate with your instructor and peers using Announcements, Discussions, and the Inbox.

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**

Zoom Video Conference

Zoom is a video conference tool that you can use to interact with your professor and fellow students by sharing screens, chatting, broadcasting live video/audio, and taking part in other interactive online activities.

Zoom meetings can be accessed via the Zoom link in the course navigation menu. Once you click on the Zoom link, it will route you to join the meeting for the respective class session. You will also be able to view upcoming meetings, previous meetings that you have already joined, and meeting recordings. Before joining an actual class session:

• Reference the Zoom Student Tutorials to learn about the tool, how to access your meeting room, and share your screen.

• Access the Zoom Test Meeting Room to test out the software before joining an actual session.

If you encounter any technical difficulties, please contact the FIU Canvas Help Team. Please ensure you contact support immediately upon the issue occurring.

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.