

## ECEN 3213 Spring 2022

### Computer Based Systems in Engineering

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**General Information:**

**Lecture Time:** MW 12:30PM-1:20PM      **Lecture Room:** NRC 108  
**Lab Time/Room:** **27028:** Monday, 3:30-5:20 PM / Endeavor 360  
**27029:** Wednesday, 3:30-5:20 PM / Endeavor 360  
**27030:** Friday, 5:30-7:20 PM / Endeavor 360  
**Instructor:** Dr. Weihua Sheng      **Email:** weihua.sheng@okstate.edu  
**Office:** 211 GAB      **Phone:** (405) 744-7590  
**Lecture Office Hours:** Tue 10:30AM-12:00PM, Thurs: 2:30PM-4:00PM  
**TAs:** Fei Liang ( [fei.liang@okstate.edu](mailto:fei.liang@okstate.edu) )  
Jiaxing Lu ( [jiaxing.lu@okstate.edu](mailto:jiaxing.lu@okstate.edu) )  
**TA Office Hours:** Mon 5:30PM-6:30PM, Wed: 5:30PM-6:30PM in Endeavor 360  
**Reference Books:** 1) Exploring Raspberry Pi: Interfacing to the Real World with Embedded Linux, 1st Edition. Derek Molloy, Wiley & Sons. 2016.  
2) Computer Organization and Design: The Hardware/Software Interface, ARM Edition. D. Patterson and J. Hennessy, Morgan Kaufmann, 2017  
**Course Website:** Canvas. <http://canvas.okstate.edu>

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**Objective:**

Computer based systems find wide applications in various engineering disciplines. This course teaches students the basic principle of computers and how they can be used to develop computer based systems, particularly for engineering applications. The course consists of both lectures and hands-on lab practices. The lab component involves the use of a Raspberry Pi embedded computer and various peripherals. Through the lab practices, students will learn how an embedded computer works, how to interface such computers to various sensors and actuators, and more importantly, how to develop software for a computer based system using a high level programming language.

**Tentative Topics:**

1. Application, history and trend of computer-based systems
2. Principles of computers: computer architecture, instruction set, assembly language
3. Software development process and C/C++ language
4. Fundamentals of computing: number representation, arithmetic/logical operations, etc.
5. Input and output: general purpose IO, serial communication (UART, SPI, I2C)
6. Analog to Digital conversion (ADC), Digital to Analog conversion (DAC)
7. Interrupts for IO
8. Memory: memory types, memory hierarchy, virtual memory/physical memory
9. Realtime control with motors

**Grading Policy:**

Component		Percentage	
Labs		30%	
Homework		15%	
Two 50-minute Middle Term Exams		30% (15% each)	
Final Exam		25%	

A	90% and above	B	80% - 89%	C	70% - 79%
D	60% - 69%	F	below 60%		

**Zoom Link of Lecture:**

<https://zoom.us/j/98601221219?pwd=SkRmcEFIQXc4cWNZL3VKc3JFcUQ0QT09>

Meeting ID: 986 0122 1219      Passcode: 507477

**Website Use:** You should check the OSU Canvas system ([canvas.okstate.edu](https://canvas.okstate.edu)) regularly for important information, assignments, laboratory projects, solutions, etc. The lecture slides will be made available on this website. Slides will normally be posted before they are used in class. You are encouraged to print off the slides and bring them to class with you. Check the web site frequently for updates.

**Exams:** There are two middle term exams and one final exam. Students will be expected to take the exams in the classroom. Students who are self-isolating, quarantined, or sick due to the COVID-19 pandemic, can take the exam online, or request a make-up exam at a different time. ECE instructors will assume that students are exercising honesty when requesting an online exam. Students should make every effort to keep their instructor informed of their testing requests to avoid last minutes surprises or accommodations.

**Laboratory:** Laboratory attendance is mandatory. The lab is an integral part of the course, reinforcing concepts from lecture and introducing new concepts. A team-based approach will be used for laboratory projects. Your participation in the lab and completion of all laboratory assignments is expected. You should attend the lab section in which you are enrolled unless other arrangements are made with the lab TA or the instructor. All laboratory sections meet in Room 360 in the Endeavor Building. Lab assignments will be posted on the class web site for you to access. For each laboratory assignment, usually both members of a group will get the same grade. However, we will adjust each student's grade accordingly if his/her contribution is significantly less or more than his/her share. Therefore, it is important that you keep your TA updated with the progress of your group and your contributions to the laboratory.

**Late Assignments:** Late assignments will have a penalty up to 50%. Missing two or more assignments (homework or lab) may be the ground for failing the course.

**Attendance:** You are strongly encouraged to attend the classes, except when you have to self-quarantine related to COVID, have health issues that put you at risk for COVID, or when you are sick. Notify the instructor beforehand if you cannot make a class due to university sponsored activities, or in emergency situations, explain to me about your absence at a later time. Accommodation may be made for students who are engaged in university sponsored activities. These students should notify the instructor as early as possible in a semester and certainly in advance of the absences to request permission for the absences (preferably in writing) from the instructor and to discuss how the absences will affect their ability to meet the course requirements.

**Office Hours:** Regular office hours are scheduled each week for any student who needs assistance with this course or who needs professional, career, curriculum, or technical advice. All students are encouraged to make the most use of the office hours. Office hours will be offered in person or through Zoom. The office hours are:

Tuesday                      10:30AM-12:00PM

Thursday                    2:30PM-4:00PM

In the event that you cannot meet during a scheduled office hour, the instructor is also available by appointment. Please contact the instructor by phone (405-744-7590) or by e-mail

([weihua.sheng@okstate.edu](mailto:weihua.sheng@okstate.edu)).

**COVID-related Mask and Social Distancing Policy:** Please follow the university rules regarding social distancing in both the lectures and the labs.

**Academic Dishonesty/Misconduct:** As a student at Oklahoma State University, you are expected to uphold the highest standard of academic honesty and integrity. Cheating on exams or quizzes, plagiarism, and copying of labs will not be tolerated. Discussion of assignments with other students for the purpose of learning the material is encouraged; however, the work you turn in should always be your own, never copied from someone else. Copying of lab assignments and the use of lab material from prior semesters are strictly forbidden. Violations will be handled in compliance with the guidelines established by the Office of Student Conduct. The instructor will give a penalty of an "F" course grade in such situations.