



## Course Syllabus

### CE 432 Robotics II (3-Credit)

---

#### 1. Professor:

Yiyan Li: BH601, [yli@fortlewis.edu](mailto:yli@fortlewis.edu)

Office Hours: Office hours will be on Microsoft Teams (virtual) for Fall 2021.

The Office hours will be MWF 9 am - 11 am, 8/30/2021 – 12/10/2021.

#### Join on your computer or mobile app

[Click here to join the meeting](#)

Send me an email if you need to talk with me in person. I'll make myself available to you if I can.

Time: MWF 2:30 – 3:25 pm (8/30/2021 – 12/10/2021)

Location: Sitter Family Hall 2771.

#### 2. Course Overview

This course focuses on the software/hardware for the development of robots. Students will work on multiple robot projects such as the ESP32-CAM robot, two-wheel balancing car, and a robot arm. Modern sensors and actuators will be introduced to students through lectures and labs. Tutorials and examples on joysticks, RFIDs, and strain gauges will be provided. Students will also learn machine learning basics for anomaly detection and realtime system programming.

**3. Course Topics and Schedule. Please visit [www.yilectronics.com](http://www.yilectronics.com), under the tag 'Teaching' to find the instructions, homework assignments, and other information.**

<i>Week 1-4</i>	ESP32-CAM Robot Design
<i>Week 5</i>	Power Supply (AC-DC, DC-DC)
<i>Week 6</i>	Sensors and Actuators
<i>Week 7-9</i>	Two-Wheel Balancing Robot
<i>Week 10, 11</i>	An Robot Arm
<i>Week 12</i>	ESP32 for Anomaly Detection
<i>Week 13</i>	Fall Break

<i>Week 14-15</i>	Realtime System
<i>Week 16</i>	Final Exam

#### **4. Course Learning Outcomes (with associated ABET criteria):**

After completing CE432 students will be able to:

- Design power supply circuits for robots. (1, 2)
- Identify correct sensors and actuators for a robot. (1, 2)
- Design the software and the hardware of a robot arm or a robot car. (1, 2, 6)
- Design a feedback system using microcontrollers. (1, 2, 5, 6, 7)
- Perform product prototyping with PCBs. (1, 2)

#### **5. Engineering Program Student Learning Outcomes (ABET criteria)**

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

#### **6. Prerequisite**

CE 241/CE341 Fundamentals of Computer Logic, at least C- AND ENGR431 Introduction to Robotics, at least C-.

#### **7. Textbook**

Rui Santos and Sara Santos, ESP32-CAM Projects. <https://randomnerdtutorials.com/esp32-cam-projects-ebook/>

Microchip, 8-bit AVR Microcontroller with 32K Bytes In-System Programmable Flash, 2015.

Other references:

[http://yilectronics.com/Courses/CE432\\_RoboticsII/lectures.html](http://yilectronics.com/Courses/CE432_RoboticsII/lectures.html)

#### **8. Grading, Homework assignments, Quizzes, and Exams**

Homework assignments and quizzes 60%, project report/presentation 20%, Final 20%.

A: 93-100, A-: 90-92, B+: 87-89, B: 83-86, B-: 80-82, C+: 77-79, C: 73-76, C-: 70-72, D+: 67-69, D: 63-66, D-: 60-62, F: <60

Homework assignments are lab reports that you should upload to the website. (Instructions for how to do this will be available to you).

Quizzes will be done in class. I'll notify you 1 week prior to the day that has a quiz.

There is only one final exam for this course. No midterm and other exams.

## **9. Policies**

Regularly being tardy for lectures, leaving in the middle of lectures, or earlier from lectures is unacceptable without prior consent of the instructor.

Cheating or plagiarism will result in an automatic F grade in the course (so do your own homework and projects).

\*\*\*\*"Fort Lewis College is committed to providing all students a liberal arts education through a personalized learning environment. If you think you have or you do have a documented disability which will need reasonable academic accommodations, and/or if you are a Veteran who may need services, please contact the Disability Services Office, 280 Noble Hall, 970-247-7383, [disabilityservices@fortlewis.edu](mailto:disabilityservices@fortlewis.edu) for an appointment as soon as possible."

### **Land Acknowledgement:**

Please consider adding a Land Acknowledge to your syllabus. See the President's Office Land Acknowledgement page (<https://www.fortlewis.edu/about-flc/leadership/presidents-office/landacknowledgment>) for the current FLC Land Acknowledgement.

### **Basic Needs Statement:**

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their learning experiences is urged to contact Kate Suazo, *Professional Advocate and Case Manager*, for support ([cmsuazo@fortlewis.edu](mailto:cmsuazo@fortlewis.edu); 970-822-8728).

FLC students may be eligible for SNAP benefits. Please contact Marissa Hunt, *Resource Center Manager* at Manna. 970-385-5095, ext. 3, or email: [services@mannasoupkitchen.com](mailto:services@mannasoupkitchen.com).

In addition, the [FLC Grub Hub](#) is a student-led, food justice organization committed to serving students and their families by sharing free food for all. Please come visit the Grub Hub in their new location in the Student Union across from the post office to learn more.

**Reach Out for Success Statement:**

College students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor, academic advisor, peer support office, or counselor. Learn about resources that assist with wellness and academic success at: <https://www.fortlewis.edu/life-at-flc/student-services/student-affairs/student-affairs-home>

If you or someone else is in immediate crisis, please call the local 24-hour crisis hotline (970) 247-5245, call the Colorado 24-hour crisis hotline (844) 493-8255, text "TALK" to 382555, or call the FLC Counseling Center during regular business hours (970) 247-7212.

**Students as Parents Statement:**

I am aware that it can be challenging to be a parent while enrolled in college courses and want to support parents to successfully pursue their education. If you are unable to attend class due to children's illnesses or unforeseen disruptions in childcare, please contact me.