UCONN
UNIVERSITY OF CONNECTICUT

ECE 3411
Microprocessor Application Laboratory
Department of Electrical and Computer Engineering

Syllabus – Fall 2025

Excluding materials for purchase, syllabus information may be subject to change. The most up-to-date the syllabus is located within the course in HuskyCT.

Course and Instructor Information

Course Title: Microprocessor Application Laboratory
Course Number: ECE 3411 (3 Credits)
Lecture Hour: M/W 2:30 – 3:20 p.m. Family Study Building (FSB) 103
Lab Hours: M/W 3:30 – 5:20 p.m. ITE C30/C33/C43 In-person

Professor: Sung Yeul Park
Email: sung_yeul.park@uconn.edu
Office Hours/Availability: M/W 3:30 p.m. – 4:30 p.m. ITEB 425/C30

TA: Jake Castellano for Lab 001 (ITEB C30)
Email: jake.castellano@uconn.edu
Office Hours/Availability: Thursday 11:00 a.m. – 12:00 p.m. ITEB 114

TA: Mohammad Hanif for Lab 002 (ITEB C33)
Email: mohammad.hanif@uconn.edu
Office Hours/Availability: Friday 11:00 a.m. – 12:00 p.m. ITEB 114

TA: Stephen Cross for Lab 003 (ITEB C43)
Email: stephen.cross@uconn.edu
Office Hours/Availability: Tuesday 10:00 a.m. – 11:00 a.m. ITEB 114

Prerequisites: CSE 3100 or ECE 1401; open only to students in the School of Engineering.

Course Materials

Required lab components: Digikey part list is available below or HuskyCT

Datasheets: Microchip AVR128DB48 datasheet, AVR128DB48 Curiosity Nano Hardware User Guide

Course Description

A microcontroller is one of the major devices in the modern digital world. Beyond the definition of microcontroller, how to use a microcontroller, how to design microcontroller-based systems and important knowledge to design microcontroller systems will be discussed. Personal lab activities, lab tests, and quizzes will be carried out.

Course Objectives

By the end of the course, you will be able to:

1. Define microcontroller terminologies.

2. Identify the main function blocks of the AVR.
3. Demonstrate downloading a program to the target board using Atmel Studio.
4. Write C code with multiple functions for given lab practices.
5. Resolve or debug programming errors.
6. Demonstrate the use of interrupts in a program.
7. Define hardware interface requirements.
8. Design task-based programming using timer/counter.
9. Read, interpret, and apply a microcontroller datasheet.

Course Outline

Date	Lecture Topics (on HuskyCT)	Lab Practice Due date	Readings
Wk1 (08/25 08/27)	Microcontroller Overview Basic digital/binary operation		Curiosity Nano board guide Datasheet: Sec 1-7
	Digital Output (LED Blinking, Delay ()) Lab practice #1		Datasheet: Sec 18
Wk2 (09/03)	Digital Input (switch input, debounce) Lab practice #2	Lab Practice #1	Datasheet: Sec 18
Wk3 (09/08 09/10)	**Quiz#1** External Interrupt (INT0) Lab practice #3	Lab Practice #2	Datasheet: Sec 10, 15, 18
	Lab test #1: GP digital input, digital output		
Wk4 (09/15 09/17)	USART Lab practice #4	Lab Practice #3	Datasheet: Sec 27
	USART with interrupt Lab practice #5		Datasheet: Sec 27
Wk5 (09/22 09/24)	Timer Lab practice #6	Lab Practice #4	Datasheet: Sec 23-25
	RTC, Task-based programming Lab practice #7	Lab Practice #5	Datasheet: Sec 26
Wk6 (09/29 10/1)	**Quiz#2** PWM Lab practice #8	Lab Practice #6	Datasheet: Sec 23-25
	Lab test #2: GPIO, Ext Int, UART, Timer		
Wk7 (10/06 10/08)	DAC Lab practice #9	Lab Practice #7	Datasheet: Sec 34
	Analog Digital Converter Lab practice #10	Lab Practice #8	Datasheet: Sec 33
Wk8 (10/13 10/15)	**Quiz#3** Op-amp Lab practice #11	Lab Practice #9	Datasheet: Sec 35
	Lab test #3: GPIO, UART, Timer, ADC		
Wk9	Final Proposal Discussion		

(10/20 10/22)	Final Proposal Discussion	Lab Practice #10	
Wk10 (10/27 10/29)	EEPROM Lab Practice #12	Lab Practice #11	Datasheet: Sec 11, 14
	Quiz#4 SPI Lab practice #13		Datasheet: Sec 28 MCP4131 Datasheet
Wk11 (11/03 11/05)	I2C Lab practice #14	Lab Practice #12	Datasheet: Sec 29 TCA74 Datasheet
	I2C with LCD Lab practice #15	Lab Practice #13	Datasheet: Sec 29 LCD Datasheet, DFR0555 datasheet
Wk12 (11/10 11/12)	**Quiz#5** Catch up	Lab Practice #14	
	Lab test #4: GPIO, UART, Timer, ADC, EEPROM, SPI, I2C	Lab Practice #15	
Wk13 (11/17 11/19)	Final Project Practice		
	Final Project Practice		
Wk14 (11/24 11/26)	Thanksgiving Break		
Wk15 (12/01 12/03)	Final Project Practice		
	Final Project Practice		
Wk16 (12/08)	Final Project Presentation		

Course Requirements and Grading

Summary of Course Grading:

Course Components	Weight
Quizzes	10%
Lab Practice	30%
Lab Test	40%
Microcontroller Project Presentation	5%
Final Project	15%
Total	**100%**

Quizzes:

Total 5 scheduled quizzes will be given during the semester. They are mainly to confirm student's understanding of the contents of study including datasheet, C programming, and specific register settings. For any reason, if you are unable to take a quiz, you should advise to instructor or TAs beforehand. There are no makeups of scheduled quizzes.

Lab Practices:

Lab practices are due typically a week after the practice is assigned. Pay attention to the due dates on HuskyCT as they may change. There is a 50% penalty if the practice is completed after the lab period. Practices will not be accepted after solutions are posted - usually a day or two after the practice is due. Lab practices must be demonstrated to the instructor or TA to receive full credit.

5 min Microcontroller Project Presentation:
Two students will form a team and present microcontroller projects, which can be found on the Cornell University Website(https://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/). Students will have 5 minutes to introduce their chosen project to their classmates. The purpose of this activity is to expose students to a variety of microcontroller projects in preparation for the final project. Please make good use of the 5 minutes to clearly present your hardware, software, pictures, and final product demonstrations. Each week during class time, two teams will take turns presenting their selected projects after lab test #1.

Lab Tests:
There will be four 3-hour in-person lab tests that will examine your ability to solve problems similar in scope to the lab practices. All parts of the exam must be completed during the 3-hour time period. Students can earn 50% for any parts that they did not complete during the exam period if they demonstrate those parts by the next class.

Grading Scale:

Grade	Letter Grade	GPA
93.0 - 100	**A**	**4.0**
90.0 - 92.9	**A-**	**3.7**
87.0 - 89.9	**B+**	**3.3**
83.0 - 86.9	**B**	**3.0**
80.0 - 82.9	**B-**	**2.7**
77.0 - 79.9	**C+**	**2.3**
73.0 - 76.9	**C**	**2.0**
70.0 - 72.0	**C-**	**1.7**
67.0 - 69.9	**D+**	**1.3**
63.0 - 66.9	**D**	**1.0**
60.0 - 62.0	**D-**	**0.7**
< 60	**F**	**0.0**

Feedback and Grades
The TA and instructor will make every effort to provide feedback and grades a few days after submission. To keep track of your performance in the course, refer to My Grades in HuskyCT.

Weekly Time Commitment
You should expect to dedicate 10 -12 hours a week to this course. This expectation is based on the various course activities, assignments, and assessments and the University of Connecticut's policy regarding credit hours. More information related to hours per week per credit can be accessed at the Online Student website.

Hardware Requirement

The part list for hardware for this course include:

	Product Number	Description	Quantity	Price (DigiKey)
1	EV35L43A	AVR128DB48 CURIOSITY NANO BRD	1	$10.26

2	CN0241	400/830 BREADBOARD KIT	1	$9.79
3	310-001	JUMPER KIT VARIOUS 22AWG 140PCS	1	$12.99
4	P120PK-F17BR5K	POT 5K OHM 1/20W PLASTIC LINEAR	2	$2.84
5	CF14JT10K0	RES 10K OHM 5% 1/4W AXIAL	10	$0.19
6	PDV-P9001	CDS PHOTORESIST 4K-11KOHM 4.20MM	1	$1.40
7	LM335Z	SENSOR ANALOG -40C-100C TO92-3	1	$0.43
8	CFM14JT330R	RES 330 OHM 5% 1/4W AXIAL	10	$0.29
9	1825910-6	SWITCH TACTILE SPST-NO 0.05A 24V	3	$0.39
10	WP710A10LID	LED RED DIFFUSED T-1 T/H	10	$1.73
11	SC-2AMK006F	CBL USB2.0 A PLUG-MCR B PLUG 6'	1	$3.12
12	TC74A0-3.3VAT	SENSOR DIGITAL -40C-125C TO220-5	1	$1.82
13	MCP4131-503E/P	IC DGTL POT 50KOHM 129TAP 8DIP	1	$0.96
14	DFR0555	LCD MOD 32DIG 16X2 TRANSMISV WHT	1	$9.90
15	2N3904TA	TRANS NPN 40V 0.2A TO-92-3	1	$0.26
16	AT-1220-TT-3V-2-R	BUZZER MAGNETIC 3V 12MM TH	1	$0.78
17	WLCR100FET	RES 0.1 OHM 1% 2W AXIAL	1	$1.93

Software/Technical Requirements (with Accessibility and Privacy Information)

The software and technical requirements for this course include:

- HuskyCT/Blackboard (HuskyCT/ Blackboard Accessibility Statement, HuskyCT/ Blackboard Privacy Policy)
- WebEx link(https://uconn-cmr.webex.com/meet/syp09004: Prof. Park WebEx account)
- Adobe Acrobat Reader (Adobe Reader Accessibility Statement, Adobe Reader Privacy Policy)
- Google Apps (Google Apps @ UConn Accessibility, Google for Education Privacy Policy)
- Dedicated access to high-speed internet with a minimum speed of 1.5 Mbps (4 Mbps or higher is recommended).
- Access to a Windows PC/laptop with Atmel Studio or access to UConn Skybox or Horizon VM Client
- Dedicated access to high-speed internet with a minimum speed of 1.5 Mbps (4 Mbps or higher is recommended).

NOTE: This course has NOT been designed for use with mobile devices.
For information on managing your privacy at the University of Connecticut, visit the University's Privacy page.

AI Usage Policy

1. Permitted AI Usage - Learning support: concept explanations, code structure understanding, syntax correction - Debugging assistance: identifying and fixing code errors - Documentation support: writing comments, drafting reports

2. Restricted AI Usage - Automatic assignment generation: generating entire code using AI - Submitting AI-generated code without citation - Misusing AI as a team member in collaborative projects

3. Citation Requirement - If AI assistance is used, include the following statement: "Some code/explanations were generated with the help of ChatGPT (OpenAI) or GitHub Copilot."

4. Communication with Instructor - If unsure about AI usage, consult the instructor or TA beforehand

5. Ethical Responsibility - AI is a tool; students are responsible for the final output - Always verify the accuracy of AI-generated information

6. **AI Use in Lab Practice and Tests - You may use AI during lab practice and lab tests. - However, if you cannot explain the written code during the demonstration to TAs, you will not receive full credit.**

Students with Disabilities

Students needing special accommodations should work with the University's Center for Students with Disabilities (CSD). You may contact CSD by calling (860) 486-2020 or by emailing csd@uconn.edu. If your request for accommodation is approved, CSD will send an accommodation letter directly to your instructor(s) so that special arrangements can be made. (Note: Student requests for accommodation must be filed each semester.)

Blackboard measures and evaluates accessibility using two sets of standards: the WCAG 2.0 standards issued by the World Wide Web Consortium (W3C) and Section 508 of the Rehabilitation Act issued in the United States federal government." (Retrieved March 24, 2013 from Blackboard's website)

Technical Help

For technical problems, please post your questions in the General Course Questions discussion forum or email the instructors.

This course is completely facilitated online using the learning management platform, HuskyCT. If you have difficulty accessing HuskyCT, you have access to the in person/live person support options available during regular business hours through the Help Center. You also have 24x7 Course Support including access to live chat, phone, and support documents.

Minimum Computer and Digital Information Literacy Skills

To be successful in this course, you will need the following technical skills:

- Use electronic mail with attachments.
- Save files in commonly used word processing program formats.
- Copy and paste text, graphics or hyperlinks.
- Work within two or more browser windows simultaneously.
- Open and access PDF files.

Evaluation of the Course

Students will be provided with an opportunity to evaluate instruction in this course using the University's standard procedures, which are administered by the Office of Institutional Research and Effectiveness (OIRE). Additional informal formative surveys may also be administered within the course as an optional evaluation tool.

Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies.

Academic Integrity Statement— Students are expected to conduct themselves in accordance with UConn's Student Conduct Code (http://www.community.uconn.edu/the-student-code). This course expects all students to act in accordance with the Guidelines for Academic Integrity at the University of Connecticut. Because questions of intellectual property are important to the field of this course, we will discuss academic honesty as a topic and not just a policy. If you have questions about academic integrity or intellectual property, you should consult with your instructor.

Policy Against Discrimination, Harassment and Inappropriate Romantic Relationships—The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any

person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate Romantic relationships can undermine the University's mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate Romantic relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. (More information is available at http://policy.uconn.edu/?p=2884.)

Sexual Assault Reporting Policy—To protect the campus community, all non-confidential University employees (including faculty) are required to report assaults they witness or are told about to the Office of Diversity & Equity under the Sexual Assault Response Policy. The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. (More information is available at http://sexualviolence.uconn.edu/.)