

JILIN NORMAL UNIVERSITY
EEGR 3233 Microprocessors

Instructor: Dr. Yiyang Li

Email: yiyangli185@gmail.com

Course Description: This class covers programming AVR microcontrollers using both the C and assembly languages to interface with peripherals for applications including LEDs, seven-segment displays, LCDs, temperature and motion sensors, remote control, PID control, interrupts, and IoT networks.

Prerequisite: Fundamentals of Computer Logic

Credits: 3. This is a three-credit engineering class.

Textbook:

AVR Microcontroller and Embedded Systems Using Assembly and C: Using Arduino Uno and Atmel Studio
By Sepehr Naimi, Sarmad Naimi, Muhammad Ali Mazidi

Objectives: This course is an introduction to system-level design using AVR microcontrollers. Students will learn how to build standalone digital embedded systems using microcontrollers and a variety of peripherals to solve real-world problems.

Academic honesty: Your conduct in this course should be an expression of honesty and integrity. Academic dishonesty is a breach of trust with serious consequences. Cases of academic dishonesty will be handled according to the procedures outlined in the Student Handbook.

Attendance policy: After three unexcused absences, any further absences may decrease the overall grade according to the following:

Late work policy: Late work will not be accepted and will receive a grade 0.

Grading:

70%: HW assignments and quizzes

30%: Final Exam

Grading Scale by %:

Letter Grade/Point Range

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	0-59

Course learning outcomes/expected performance criteria:

Upon completion of this course students will:

Be able to understand technical documents or data sheets of microcontrollers.

Be able to write c code to control a variety of display modules, sensors

Be able to manage interrupts for multiple tasks

Be able to implement PID controllers for light sensors

Be able to design PCBs to host simple embedded systems for real world applications

Be able to connect wireless devices to remote servers for IoT applications

Weekly Schedule:

Weeks	Dates	Lectures	Notes	Homework Assignments
Week 1	5/28 Tuesday 8 - 9:40	Introduction to the course	temperature sensor project ASIC WDC senior sem project slides week 1 lecture slides	
	5/29 Wednesday 14 - 15:40 16 - 17:40	Digital Logic Basics MCU C Programming Practice I LEDs notes	Quiz 1 Having issues with connecting your Chuangke Board to your laptop? See here	
	5/30 Thursday 14 - 15:40	Digital Logic Basics II notes	Quiz 2 The For Loop The NAND Gate in LTSpice	
	5/31 Friday 14 - 15:40	Operators, Masks notes		
	6/1 Saturday 10 - 11:40	C Programming Basics notes	Quiz 3	HW1 , due Friday 6/7 HW1 Solutions
Week 2	6/4, Tuesday 8 - 9:40	SSDs notes	Lecture on SSDs and demonstration of the tasks in Quiz 3	HW2 , demonstration due Wednesday, by 17:40 pm
	6/5 Wednesday 14 - 15:40 16 - 17:40	More on SSDs, SR Flip Flops Work on the SSD demonstration notes	More about the SSDs	
	6/6 Thursday 14 - 15:40	Power Supplies for MCUs PCBs for System Prototyping	Install Eagle PCB, PCB Introduction	
	6/7 Friday 14 - 15:40	Assembly with Arduino video, notes	Tutorial on assembly programming Lecture slides	HW3, A simple voltage divider circuit in Eagle PCB (demo and answer questions), due Wednesday 6/19
	6/8 Saturday 10 - 11:40	Duanwu Break	No lecture, no quizzes	
Week 3	6/11 Tuesday 8 - 9:40	More on Assembly Programming video, notes	Quiz 4 on C and assembly programming	Work on HW2 and HW3 Install Microchip Studio Be ready on Eagle PCB Questions
	6/12 Wednesday 14 - 15:40 16 - 17:40	HW2 Demo HW1 Review notes	Quiz 5 on assembly	HW2 is due today
	6/13 Thursday	Even More on Assembly	Lecture slides	Work on HW3

	14 - 15:40	video, notes	Quiz 6 on assembly	
	6/15 Saturday 8 - 9:40 10 - 11:40	Classes canceled due to the national standard English tests		
Week 4	6/19 Wednesday 14 - 15:40 16 - 17:40	A Line Following Robot (code) PCB: Self-Defined Library. The SSD library. LCDs, Sensors, Interrupts More on Assembly (I/Os) video, notes	Quiz 7 (extra credits), if you were not there, you are not losing any points.	HW3 is due today HW4: (200 points) Build the circuit on the breadboard for the the line following robot car. Teamwork. Demo on Saturday. Tutorial
	6/20 Thursday 14 - 15:40	PCB Panelization video, notes		HW5: (200 points) 1. Build a temperature monitor on your breadboard. Demo on Saturday and Wednesday. Tutorial (the complete code was not tested) 2. Finish the PCB design for the temperature monitor. Use self-defined library components for the display module and the thermister. Demo on Saturday and Wednesday.
	6/22 Saturday 8 - 9:40 10 - 11:40	Work on HW4, HW5, and the Project Bring your laptop, Arduino Kit, and the robot car video, notes		HW6
Week 5	6/26 Wednesday 14 - 15:40 16 - 17:40	Work on HW4, HW5, and the Project Bring your laptop, Arduino Kit, and the robot car		
	6/27 Thursday 14 - 15:40	Final Exam		

