

Course Syllabus

Welcome to Single-Chip Microcomputers. This course expands your knowledge of microprocessors from ECE 445 and puts them into a system context. You will be introduced to the principle of a microcontroller, which comprises all elements of a basic computer system on a single chip, i.e. microprocessor, memory and I/O devices. Based upon this single-chip microcomputer, you will learn how to interface it with other devices, such as sensors, keypads, and displays. This course also covers real-time control issues, assembly language programming for control, design of control software, input/output methods, design tools, and available single-chip microcomputers. In the associated lab you will be designing and constructing systems including a single-chip microcomputer and ancillary hardware to implement a complete control system.

Topics: Include introduction to the MSP 430, software development using C and assembly, polling, interrupts, timers, real time clock (RTC), ADC, DCA, serial peripheral interface (SPI), I2C, RS232, USB.

Faculty:	Classes and Coordination	Jens-Peter Kaps	jkaps@gmu.edu
Lab Instructors:	All labs, lab exam	Sunil Kumar Rajendran	srajend2@gmu.edu
	All labs, lab exam, lab grading	Aditi Atul Khare	akhare2@gmu.edu
Lectures:	Tuesday, Thursday,	3:00 – 4:15 pm	Robinson B201
Labs:	Monday, Thursday,	4:30 – 7:10 pm	ENGR 3208
	Friday,	8:30 – 11:10 am	ENGR 3208
Class Web Page:	http://ece.gmu.edu/~jkaps/courses/ece447 and on MyMason		
Textbooks:	M. Jiménez, R. Palomera, and I. Couvertier, Introduction to Embedded Systems, Using Microcontrollers and the MSP430 , Springer-Verlag New York, 2014, ISBN 978-1-4614-3142-8		
	J. H. Davies, MSP430 Microcontroller Basics , Burlington, MA: Newnes, 2008, ISBN 978-0-7506-8276-3.		
	B. W. Kernighan, and D. M. Ritchie, The C Programming Language, 2nd Ed., Englewood Cliffs, NJ:Prentice-Hall, 1998, ISBN 0-13-110362-8 (paperback).		
Hardware:	Each student is expected to purchase a lab kit		
Software:	Code Composer Studio v9	http://www.ti.com/tool/ccstudio	

Office Hours:

Jens-Peter Kaps	Tuesday	11:00 am – 12:00 pm	ENGR 3222
	Thursday	1:00 pm – 2:00 pm	
Sunil Kumar Rajendran	Thursday	12:00 pm – 1:00 pm	ENGR 3208
Aditi Atul Khare	Monday	2:00 pm – 4:00 pm	ENGR 3208
	Friday	11:30 am – 1:30 pm	
Raj Amit Mehta (quizz grading) rmehta21@gmu.edu	Wednesday	1:30 pm – 2:30 pm	ENGR 3204

Please check the class web page for updates to this office hour schedule.

The best way to contact us outside class and office hours is via e-mail. Please start the subject line of your e-mail with "ECE447:". You must use your Mason e-mail account. **For questions that might interest several students, please use the discussion group on MyMason.**

Required Background:

- ECE 445 Computer Organization (grade C or better) and either
 - CS 367 Computer Systems and Programming (grade C or better)
- or
- CS 222 Computer Programming for Engineers (grade C or better)

Course Schedule

The course schedule is provided in a separate document on MyMason and the class website.

Reading Assignments

The reading assignments are shown in the class calendar in the rightmost column, first row in a week. They refer to sections in the Jiménez et.al or the Davies text that need to be read by the beginning of the week. They are also shown on each homework.

Homework / Quizzes:

There will be up to 12 homework assignments during the course of this class. These homeworks will be based on reading assignments and material covered in class and consist of several questions. The homework will not be collected or graded. The homework questions will be posted on Tuesdays, the solutions will be posted on Fridays. The following Tuesday, which is denoted as the homework due date on the calendar, will be an in-class quiz based on the homework. The quizzes will be collected and graded.

For maximum benefit of these homework assignments you are encouraged to try to solve the questions before the solutions are published. You should discuss your work with other students in the class. Once the solutions are published, try to learn from them and see where you went wrong.

Labs:

This course features a senior lab component. Students in ECE 447 will be granted access to the ENGR Room 3208 computer lab to complete their projects. More information about the labs can be found in a separate lab syllabus.

General suggestions:

- Write a simple test program for every hardware component you attach to debug the hardware. Keep these programs to test the hardware again when something goes wrong.
- Then write the main program, step by step, and test each step.
- Don't miss the sign-off deadlines and demonstrate your project, even if you have not completed it.

Exams:

There will be two midterm exams during the course and one final exam. There will be NO make-up exams. (See Dr. Kaps for an exception at least **4 weeks** before the exam.) Students who are more than 15 minutes late for an exam may not be admitted and will be assigned a grade of zero for the exam. All exams are **closed book**. You will be allowed to use the "MSP430 Reference Document" on all exams.

- **Midterm Exam 1:** Thursday October 10th.
- **Midterm Exam 2:** Thursday November 21st.
- **Final Exam:** Thursday December 12th, **1:30pm** – 4:15pm.

Grading:

The final grade is based on a weighted sum of your performance in exams, homeworks, recitations and class participation:

	Total
Lab Assignments	40%
Midterm Lab Exam	10%
Midterm Exam 1	15%
Midterm Exam 2	15%
Final Exam	10%
Quizzes	10%
	100%

Credits:

This course has 3 lecture hours and 3 lab hours per week and a total of 4 credits. For EE students, this course counts as 1 technical elective and 1 advanced laboratory course.

Honor Code:

All rules of the GMU Honor Code system will be in effect. You must review the rules and be familiar with them.

You are encouraged to discuss your laboratory projects with other students and/or obtain the assistance of the TA. Nevertheless, you must write down your own solutions which represent your understanding of the material. Labs must be completed individually. No part of a lab submission can be copied from another student of the class from this or previous years or any other source.

Duplicating someone else's work such as but not limited to, hard-ware/software designs, diagrams, source code, project reports, and exam notes, is considered cheating. If you use material from other sources such as but not limited to the web, books, journals, data sheets, etc. you must reference the source. Honor code violations will be followed up with full force.

Classroom Etiquette:

Cellphones have to be put into silent mode. If you have an emergency need to answer a call please quietly leave the room BEFORE answering the call. Lectures may not be recorded without express written permission from the instructor.

Students with Disabilities

If you need special assistance, please inform the instructor within the first 3 weeks of classes so that we can work something out.