

George Mason University  
 Volgenau School of Engineering  
 Department of Electrical and Computer Engineering

**ECE 447: Single-Chip Microcomputers**  
 Syllabus  
 Spring 2014

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**Lecture:** Tuesday / Thursday, 12:00 – 1:15pm      Music Theater Building, room 1004

**Office Hours:** See class webpage (provided below).

**Prerequisites:** Grade of C or better in ECE 445 and either CS 367 or CS 222.

**Required Text:** *MSP430 Microcontroller Basics*, by J.H. Davies  
 ISBN-13: 978-0-7506-8276-3

**Suggested Text:** *Microcontroller Programming and Interfacing*, by S. F. Barrett, and D. J. Pack  
 ISBN: 978-1-60845-713-7 (paperback).  
*The C Programming Language, 2<sup>nd</sup> Edition*, by B. W. Kernighan, and D. M. Ritchie  
 ISBN: 0-13-110362-8 (paperback).

**Hardware:** Each student is required to purchase a lab kit.

**Software:** IAR Kickstart Environment      <http://www.ti.com/tool/iar-kickstart>  
 Code Composer Studio (v.5)      <http://www.ti.com/tool/ccstudio>

**Course Webpages:** <https://mymasonportal.gmu.edu/> (Blackboard)  
<http://ece.gmu.edu/~clorie/spring2014/ece447/>

#### COURSE DESCRIPTION

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: an introduction to the MSP430, software development using C and assembly, polling, interrupts, timers, real time clock (RTC), ADC, DCA, serial peripheral interface (SPI), I2C, RS232.

COURSE SCHEDULE:

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

READING ASSIGNMENTS

Reading assignments are posted on the class schedule. In general, the assignments refer to sections of the Davies text. The assigned reading must be completed by the beginning of each week. Additional reading assignments, at the latter part of the semester, will come from the TI website. These documents can be downloaded from the TI website, the class webpage, or Blackboard. They should be printed and reviewed.

HOMEWORK ASSIGNMENTS

There will be weekly homework assignments. Each assignment will consist of the above mentioned reading assignment and a related problem set. These problems are intended to exercise your understanding of the material covered in class and in the reading, and to provide you with an opportunity to apply what you have learned to academic and practical problems. This practice should help you prepare for the exams. You are expected to complete all of the assigned problems to the best of your abilities. You are encouraged to work together on the homework assignments and to share ideas about how to solve the problems.

The homework assignments will be posted on Blackboard. The due date for each assignment is specified in the course schedule (provided in a separate document). Solutions to each problem set must be submitted at the BEGINNING of class on the specified due date. Late submissions will NOT be accepted.

Homework solutions should be formatted as follows:

1. Your name should appear at the top-left on all pages of your solutions.
2. The class number (ie. ECE 331) and the assignment number should appear below your name.
3. All pages should be numbered at the top-right.
4. All pages should be stapled together.
5. All solutions should be written neatly and clearly – if we cannot read it we will not grade it!
6. Solutions to individual problems should be clearly separated – you should either use a horizontal line to separate problem solutions or you should start the solution to a problem on a new page.

Failure to follow the above guidelines will result in a **zero** on the assignment!

GRADING OF EACH PROBLEM SET:

Two problems selected at random	Graded for completeness and correctness	4 pts. each
Remaining problems	Graded for effort	1 pt. each

The lowest homework grade will be dropped at the end of the semester.

EXAMS

There will be two exams in this course:

- Midterm Exam
- Final Exam

See the course schedule for the date of each exam.

All exams are **closed book**. I will provide the necessary reference materials for all exams.

If you cannot make one of the scheduled exams, you must speak with me **in advance** to arrange for an alternate time to take the exam.

LABORATORY

This course features a senior laboratory component. Students in ECE 447 will be given access to the computer lab, room 3208 in the Nguyen Engineering Building, to complete their projects.

Additional information about the laboratory experiments can be found in the [Lab Syllabus](#), provided separately.

COURSE GRADE

The final grade for the course is based on my best assessment of your understanding of the material and your participation in the class during the semester. The exams, homework, laboratory experiments and laboratory midterm will be used to determine your preliminary final grade according to the following weighting:

Homework	10%
Midterm	15%
Final	25%
Lab Experiments	40%
Lab Midterm	10%

The final letter grade will be assigned accordingly.

CREDITS

This course includes 3 lecture hours and 3 lab hours, and is worth a total of 4 credits.

For Electrical Engineers, this course counts as one technical elective and one advanced laboratory course.

### ACADEMIC INTEGRITY

The George Mason University Honor Code is stated as follows:

*"To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set for this:*

*Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work."*

You are expected to abide by the Mason Honor Code. Violations of the Honor Code are taken very seriously and will be prosecuted to the fullest extent. This includes, but is not limited to, cheating on homework assignments, quizzes, projects, labs, and exams.

As indicated above, you are encouraged to work together on assessments, and share ideas about solutions to problems. However, you must submit your own work. Copy the solution from another student, or from the author's solution manual, is considered cheating and is a violation of the Honor Code.

For more information about the Mason Honor Code and about the Honor Committee, please visit the website for the Office of Academic Integrity (<http://oai.gmu.edu/>).

### GMU EMAIL ACCOUNTS

Students must use their Mason email account to receive important University information, class-related messages, and to communicate with the professor and the teaching assistants.

See <http://masonlive.gmu.edu> for more information.

### CLASSROOM ETIQUETTE

Cellphones are to be turned off during class; minimally they must be silenced. Emergency calls may be taken, but must be taken outside of the classroom.

Texting, using your laptop for something other than lecture-related work, etc. is considered a distraction to me and to the other students trying to learn in the class, and will not be tolerated.

OFFICE OF DISABILITY SERVICES (ODS)

If you are a student with a disability and require special accommodations, please contact me and the Office of Disability Services as soon as possible. All special accommodations must be arranged through ODS.

Office of Disability Services (ODS): (703) 993 – 2474; <http://ods.gmu.edu>

OTHER USEFUL CAMPUS RESOURCES

- Writing Center: A114 Robinson Hall; (703) 993 – 1200; <http://writingcenter.gmu.edu>
- University Libraries: “Ask a Librarian” <http://library.gmu.edu/mudge/IM/IMRef.html>
- Counseling and Psychological Services (CAPS): (703) 993 – 2380; <http://caps.gmu.edu>
- The University Catalog: <http://catalog.gmu.edu>
- University Policies: <http://universitypolicy.gmu.edu>