EET4141 – Microcomputer Interfacing
4 CREDITS - (3 Hours Recitation + 3 Hours Lab)
Fall 2010

Course Description:

The purpose of this course is to introduce the student to the concept of a microprocessor as an electrical system component used to help solve real time problems in control, communications, etc. This is done in two parts: In the first part the student is introduced to the architecture, programming, and interface requirements of a real microcontroller, the Motorola 68HC11. The second part investigates specific applications from several engineering areas showing how a microprocessor-based system can be used to handle the problem.

Instructor: Dr. Nasser Alaraje
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Office Hours: MWF 3:00 – 5:00 pm (or by appointment)

Classroom/Time: MWF 12:05 – 12:55 pm, EERC 314
Lab/Time: T 2:05 – 4:55 pm, EERC427
Prerequisite: EET2141 or CS 1121

Course Webpage: http://www.tech.mtu.edu/~alaraje/ Fall2010/EET4141/EET4141Fall2010.html

Textbook: *Data acquisition and process control with the M68HC11 micorcontroller* by F.F. Driscoll, R.F. Coughlin, R.S. Villanucci, 2*nd* edition, Prentice Hall , 2000

References:
1. *Microprocessors and Microcomputers: Hardware and Software* by R.J. Tocci and F.J. Ambrosio, 6*th* edition, Prentice Hall, 2003
2. *Digital Systems: Principles and Applications* by R.J. Tocci and N.S. Widmer, 8*th* edition, Prentice Hall, 2001
2. *CME11E9-EVBU Development Board User's Manual*

Course Objectives:
Upon Successful completion of this course, students should:

- Learn the basic architecture, programming and interface requirement of M68HC11
- Apply Microcontroller System (M68HC11) assembly language to solve problems.
- Interface M68HC11 to parallel ports, A/D ports .. etc to solve real microcontroller application.
- Learn the concept of in circuit development as a development tool and how to use assembler and THRSim simulator to help with design development

Course Outline:

Week 1	Introduction: Microprocessors, buses, and data flow
Week 2	Instruction and memory organization I/O operations: Register and programming
Week 3	Introduction to the M68HC11 microcontroller, EVB commands and M68HC11 assembler software 68HC11 Architecture: Registers and their functions

	Condition Codes and addressing modes
Week 4	Instruction set
Week 5	Instruction set cont. Programming principles Review and Exam1
Week 6	Assembly directives /Utility subroutines and applications using indexed addressing
Week 7	Review: port pins, 68HC11 I/O capabilities Parallel, digital I/O Time-delay subroutines and the timer system of the 68HC11 MCU
Week 8	Introduction to microcomputer interface, A/D and D/A converters
Week 9	Port E of the 68HC11 MCU – A/D converter
Week 10	Review and Exam 2
Weeks 11& 12	Interrupt types, operation, processes operation Practical interface considerations and serial data communications
Weeks 13 & 14	Design Example/Applications
Week 15	Final Exam

Lab assignments and course projects:

Week 2	THRSim Simulation and CME11E9-EVBU board
Week 3	Parallel Interfaces (Port B and Port C)
Week 4	Indexed Addressing and Branch Instruction
Week 5	Software Timing Loops
Week 6&7	Output Compare Timing
Weeks 8 & 9	Light Show
Week 10,11	Keypad Interface and Scanning
Week 11,12	Analog to Digital Conversion
Weeks 13,14	Keypad Interface and Digital Thermometer

Grading:

Your final grade is based on the grade weighting plan below which gives you the highest grade, 75% of your grade toward class as follows:

	Plan A	Plan B	
Homework, quizzes	15%	15%	
Computer Projects	5%	5%	
Hour exams	60%	20%	**Week 5 & Week 10**
Final exam	20%	60%	

Your lab assignments represent 25% of your total grade

Scale:				
	90-100	A	70-74	C
	85-89	AB	65-69	CD
	80-84	B	60-64	D
	75-79	BC	0 -59	F

Computer Usage: Using PC computers with THRSim simulation software and CME11E9-EVBU development board for lab assignments.

Cheating: University rules require that any student caught cheating or copying from another student receive a failing grade for the course and be reported to the Dean of Students. **Copying includes copying or sharing any part of a computer file.**

Copying Software: Most software packages are copyrighted and protected under the laws of the United States. Anyone who copies such a software package in violation of the software license is committing a Federal offense and is subject to prosecution.

Make-up policy:

- The final examination may only be taken at the scheduled time. You *must not* make travel plans that conflict with the final exam schedule.
- Midterm examinations may be made up only due to illness on the day of the exam (a doctor's note is required) or by advance arrangement (a written request one week in advance of the exam is required). The instructor reserves the right to deny any advance request for a make-up exam.

Use of Electronic Devices:
Cell phones, Blackberries, iPods, PDAs, or any other electronic devises **are not to be used in the classroom**. Please make sure to bring a calculator with you to class. Calculators on other devices are strictly prohibited. Information exchanges on these devices during class are also prohibited and violate the Academic Integrity Code of Michigan Tech.

University Policies:
Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance the University's policies. If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see me as soon as possible so that we can make appropriate arrangements. The Affirmative Action Office has asked that you be made aware of the following:

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at 487-2212. For other concerns about discrimination, you may contact your advisor, department head or the Affirmative Action Office, at 487-3310

Academic Integrity: http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html
Affirmative Action: http://www.admin.mtu.edu/aao/
Disability Services: http://www.admin.mtu.edu/urel/studenthandbook/student_services.html#disability

Changes:
This syllabus is subject to change as found appropriated by the instructor. The changes will be announced in class in a timely fashion.