Faculty of Engineering and Applied Science

ENGINEERING 4862: Microprocessors

Instructor	**Lihong Zhang**	**Teaching Assistants**	**TBD**
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Office Location	**EN-3073**	**Office Location**	**TBD**
Office Hours	**11:00-12:00 Thursdays**	**Office Hours**	**TBD**
	13:55-14:55 Fridays		

Website   http://www.engr.mun.ca/~lihong/teaching/EN4862/engi4862.htm and http://online.mun.ca

Communication   *Office-hour visits or inquiries to the instructor's MUN email*

CALENDAR ENTRY:

Microprocessors is a course on microprocessor architecture; assembly language programming: addressing modes, table look up; memory mapped devices; interfacing techniques: parallel, serial; timing control; analog input and output, and computer displays.
   LH: eight 3-hour sessions per semester
   OR: nine 1-hour tutorial sessions per semester
   PR: ENGI 3861

CREDIT VALUE: 3 credits

COURSE DESCRIPTION:

 The topics will cover, but not be limited to: computer architecture, history of microprocessors and microcontrollers, microprocessor and microcontroller architectures, instruction execution details, instruction set, assembly language programming, addressing modes, software development, memory interfacing, use of handbooks and data sheets, I/O interfacing, timing issues, peripheral chips or equivalent functionality within microcontrollers, A/D and D/A converter interfacing, parallel and serial I/O, system design.

SCHEDULE:	LECTURE: MTH 1:00-1:50	Room: EN2007
	LAB: Tuesday 9:00-11:50	Room: EN1040
	TUTORIAL: Monday 11:00-11:50	Room: EN1054

RESOURCES:

TEXT BOOK

- *The AVR Microcontroller and Embedded Systems: Using Assembly and C (1st Edition). By Muhammad Ali Mazidi, Sarmad Naimi, Sepehr Naimi, published by Prentice Hall, January 2010.*

REFERENCES

- *Course Manual for ENGI-4862 (Each student should sign out one copy from the technologists (in EN-1038C). This booklet can be brought to exams).*
- *Dhananjay V. Gadre, Programming and Customizing the AVR Microcontroller, Second Edition, McGraw-Hill, 2007.*
- *Steven F. Barrett, Atmel AVR Microcontroller Primer: Programming and Interfacing, Morgan & Claypool Publishers, 2007*
- *Steven Barrett and Mitchell Thornton, Embedded Systems Design with the Atmel AVR Microcontroller (Synthesis Lectures on Digital Circuits and Systems), Morgan & Claypool Publishers, 2009*
- *Richard Barnett, Sarah Cox, and Larry O'Cull, Embedded C Programming and the Atmel AVR, Second Edition, Delmar Cengage Learning, 2006*

MAJOR TOPICS:

- Introduction to Microprocessors
- Basics of Computers
- Semiconductor Memory
- Interfacing with CPU
- Microcontroller and AVR
- AVR Basics
- AVR I/O Programming
- AVR Arithmetic and Logic Instructions
- AVR Advanced Assembly Language Programming
- AVR Timer Programming
- DAC and ADC Interfacing
- Software Timing and RISC
- AVR Hardware Issues
- AVR Programming in C and Interrupt

MEMORIAL UNIVERSITY

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LEARNING OUTCOMES:

Upon successful completion of this course, the student will be able to:

	LEARNING OUTCOMES	GRADUATE ATTRIBUTES. LEVEL*	Methods of Assessment
1	Demonstrate knowledge of computer organization.	1.2	Assignments, Midterm Tests, Final Exam
2	Understand the fundamentals of a popular microcontroller family in the context of hardware and software features, such as instruction execution details, instructions set, addressing modes, software development, etc.	1.2, 2.2	Labs, Assignments, Midterm Tests, Final Exam
3	Demonstrate knowledge of assembly language programming.	3.2, 4.2, 5.2	Labs, Assignments, Midterm Tests, Final Exam
4	Design and interface processors/microcontrollers with memory.	1.2, 2.2, 3.2, 4.2	Assignments, Midterm Tests, Final Exam
5	Design and interface processors/microcontrollers with input/output devices.	2.2, 3.2, 4.2	Labs, Assignments, Midterm Tests, Final Exam
6	Demonstrate knowledge of microprocessor peripheral chips and/or equivalent functionality within microcontrollers.	4.2, 5.2	Labs, Assignments, Midterm Tests, Final Exam
7	Use handbooks and data sheets.	5.2	Labs, Assignments, Midterm Tests, Final Exam
8	Develop skills for system design by using microprocessors/microcontrollers.	3.2, 4.2, 5.2, 6.1	Labs, Assignments, Final Exam

*Each Graduate Attribute for each learning outcome is rated at a Content Instructional Level between 1 and 3 (1=Introductory, 2=Intermediate Development, 3=Advanced Application).

See www.mun.ca/engineering/undergrad/graduateattributes.pdf for definitions on the 12 Graduate Attributes and the Content Instructional Levels.

ASSESSMENT:

Approximate Due Dates

Assignments   8%   (1.6% each)
    Assignment 1   May 26
    Assignment 2   June 7
    Assignment 3   June 27
    Assignment 4   July 5
    Assignment 5   July 28
Labs   13% (1.625% each)
    Lab 1 Report   June 2
    Lab 2 Report   June 9
    Lab 3 Report   June 16

Lab 4 Report		July 7
Lab 5 Report		July 7
Lab 6 Report		July 14
Lab 7 Report		July 21
Lab 8 Report		July 28
Midterms	24% (12% each)	
Midterm 1		June 16
Midterm 2		July 14
Final exam	55%	TBA

Note:

1. The labs are based on Atmel STK600 and AVR Studio. Students will work in groups of two. There are totally 8 labs. Everyone in the class must complete ALL of the labs. The lab manuals will be available on the website in PDF format before the start of the lab. As Lab #2, Lab #3, Lab #4, and Lab #5 may take longer time to complete, preparation is essential. TAs will mark individual pre-labs at the beginning of each lab session. At the end of each lab, each group should submit one report consisting of individual pre-labs, circuit diagrams, observations, calculations, software listings, answers to questions and results.

2. Any concerns about marking or special circumstances must be brought to the instructor's attention before the final exam. After the final exam has been written, only that mark might be re-considered.

3. Calculator policy: only simple scientific calculators are permitted in all quizzes, tests and examinations. Programmable calculators with text storage and graphics capabilities, as well as other aids (e.g., unauthorized books, notes, formula sheets, electronic translators and devices, etc.) are NOT allowed. Unauthorized use of the aids or devices above during quizzes, tests and examinations will be considered as an academic offence.

LAB SAFETY:

Students are expected to demonstrate awareness of, and personal accountability for, safe laboratory conduct. Appropriate personal protective equipment (PPE) must be worn (e.g. steel-toed shoes, safety glasses, etc.) and safe work practices must be followed as indicated for individual laboratories, materials and equipment. Students will immediately report any concerns regarding safety to the teaching assistant, staff technologist, and professor.

ACADEMIC INTEGRITY AND PROFESSIONAL CONDUCT:

Students are expected to conduct themselves in all aspects of the course at the highest level of academic integrity. Any student found to commit academic misconduct will be dealt with according to the Faculty and University practices. More information is available at

http://www.mun.ca/engineering/undergrad/academicintegrity.php

Students are encouraged to consult the Faculty of Engineering and Applied Science Student Code of Conduct at http://www.mun.ca/engineering/undergrad/academicintegrity.php and Memorial University's Code of Student Conduct at http://www.mun.ca/student/conduct/.

INCLUSION AND EQUITY:

Students who require accommodations are encouraged to contact the Glenn Roy Blundon Centre, http://www.mun.ca/blundon/about/index.php. The mission of the Blundon Centre is to provide and co-ordinate programs and services that enable students with disabilities to maximize their educational potential and to increase awareness of inclusive values among all members of the university community.

The university experience is enriched by the diversity of viewpoints, values, and backgrounds that each class participant possesses. In order for this course to encourage as much insightful and comprehensive discussion among class participants as possible, there is an expectation that dialogue will be collegial and respectful across disciplinary, cultural, and personal boundaries.

STUDENT ASSISTANCE: Student Affairs and Services offers help and support in a variety of areas, both academic and personal. More information can be found at www.mun.ca/student.

ADDITIONAL INFORMATION:

Comments, suggestions and constructive criticisms are always welcome.