

DALHOUSIE UNIVERSITY

Department of Electrical and Computer Engineering

ECED 3204 – Microprocessors

Jason GU

1. Course Description

This course introduces a currently available microprocessor system. Topics include microcontrollers as a type of microprocessor, microprocessor architecture, address, data and control buses, allocation of external memory modules, use of decoders, latches, flip-flops and other elements of a microprocessor system, CPU bus cycle, cycle-by-cycle execution, timing diagrams, I/O methods, I/O allocation, asynchronous serial communication (USART), RS-232 standard (I²C, SPI, TWI), parallel port interfacing, handshaking protocols, timers, timer functions, interrupts, interrupt priority, assembly programming, software development and debugging.

2. Time Required

1. Lectures: 2 lectures / week for 13 weeks.
2. Laboratory: 2 hours/week for 11 weeks.

3. Text

The Atmel AVR Microcontroller: Mega and X Mega in Assembly, 2014 Edition, by Han-way Huang

References

Lecture notes.

Course Web-site-- <http://www.jasongu.org/3204/> and Brightspace.

Software: Atmel Studio 6.2-- <http://www.atmel.com/>

Office Hours 1:00pm - 3:30pm on Mondays

4. Course Evaluation

Assignments	10%
Laboratory	20%
Midterm(2 h written)	30%
Final Exam (3 h written)	40%

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Topics	Chapter/Lectures
Part I. Introduction to Microcontroller:	1,2/2
Brief introduction of microcontroller. Brief computer history is given. Embedded system and memory are covered. AVR introduction is given	
Part II. Assembly and C Language Programming	3,4,5,6/6
a) Assembly Language and subroutine calls	
b) Development tools	
c) C Language	
Part III. Clock, I/O and Interrupt	7,8,9,10/5
a) Clock system of AVR	
b) I/O and Advanced I/O	
c) Interrupt	
Part IV. Timer Function	11,12/2
a) Introduction to Timer System	
b) Different timer function modes	
Part V. Communication and Interface	13,14,15,1 6/8
a) Universal Synchronous Asynchronous Receiver Transmitter (USART)	
b) SPI function	
c) Two-Wire Interface	
d) A/D converter	
Review	1

The midterm will take place on Thursday, October 26, 2017 in TBA. It is closed book exam with 1 letter-size page formula sheets allowed. No problems or examples on the formula sheets. The department will schedule final exam.