

**MIAMI UNIVERSITY  
SCHOOL OF APPLIED SCIENCE  
DEPARTMENT OF ENGINEERING TECHNOLOGY**

<b>ENT 295</b>	<b>MICROPROCESSOR TECHNOLOGY I</b>	<b>3</b>
Course Number	Title	Credit hours

**COURSE DESCRIPTION**

Introductory study of the architecture, operation, and application of microprocessors for commercial and industrial use. Emphasis is placed on understanding internal architecture, segmentation, arithmetic instructions, and the role of I/O ports, memory and machine language play in putting the microprocessor to work.

**PREREQUISITES:** CSA 153 Intro to 'C' Programming

This course ENT 295 is a prerequisite to ENT 297 Microprocessor Technology II

**TEXT MATERIAL:**

Han-Way Huang, The HCS12/9S12: An Introduction. Software and Hardware Interfacing.  
Dave Hergert & Nancy Thibeault, PC Architecture from Assembly Language to C (Handout)

**COURSE OBJECTIVE:**

The student will develop an understanding of the basic architecture, machine language and interfacing of the Motorola 68HCS12 Microprocessor.

**COURSE OUTCOMES:**

Students completing this course will have an understanding of and ability to apply:

1. Microprocessor architecture
2. Assembly language programming
3. Bus timing diagrams
4. Bus structures
5. Memory technologies and interfacing
6. Input/output interface
7. Input/output systems
8. Interrupt-processed input/output
9. Direct memory access (DMA)
10. Microcontroller applications

**MEETING PLACE AND TIME:**

**INSTRUCTOR:**

Office Hours:

**METHOD OF EVALUATION:**

Tests 10% each	30%
Homework	10%
Labs	15%
Project	10%
Midterm Exam	15%
Final exam	20%

Course grade: 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = F

**NOTES:**

1. The instructor may make changes as deemed necessary.
2. The order may be changed depending upon students'/instructor's needs.
3. Homework assignments and laboratory reports are due at the beginning of the next class meeting.
4. Late submissions of assignments will result in a reduced grade.

**COURSE SCHEDULE AND TOPICS:**

Class	Date	Book Section & Topics	Labs and Tests	Homework
1		Handout: Easy 4	Lab 1: Easy4 Programming	Easy4 Handout Ch. 2: 1-7
2		Handout: Easy 4	Lab 2: Easy4 Programming	Easy4 Handout Ch. 2: 8-14
3		1.1–1.11 Computer, Software, CPU Registers, Memory addressing, Addressing modes, Instructions	<b>Test-1</b>	Ch. 1: 1-10, 12,14,15
4		3.2– 3.6.3 Hardware and Software Development Tools, Assembler 3.8 D-Bug 12 Monitor	Lab 3: Getting Started	None
5		3.9 Debugging 2.2, 2.3 Assembler Directives	Lab 4: Trouble-shooting Tools	None
6		2.4, 2.5 Assem. Prog. Development Process, Arith. Probs.	<b>Test-2</b>	Ch. 2: 1-9
7		7.2 - 7.5 Basic I/O Concepts, Parallel Ports; 2.6 Looping	Lab 5: Switches and LEDS	Ch. 7: 1-3
8		2.7, 2.8, 2.10 Bit Cond. Branch, Shift & Rotate, Boolean, Execution Time; 4.2 – 4.4 Stack, Indexable Data Structures	Lab 6: Looping, timing, LED drive	Ch. 2: 10,13,14,17,19
9		4.6 - 4.9 Subroutines, Stack Frame, Ex.: Multibyte Division, Bubble Sort	<b>Mid-term Exam</b>	Ch. 4: 1, 3 -11
10		6.2 - 6.5 Interrupts, Clock, Reset, PLL	Lab 7: Interrupts	Ch. 6: 1-8
11		7.6, 7.7.1, 7.7.2, 7.9 Electrical Characteristics, LEDs, 7-segment	Lab 8: 7-Segment Disp, Subroutines	Ch. 7: 4-7
12		4.5 Data Structures – Strings BCD-ASCII- Binary Conversion Character/Word Counting, Word Matching, String Insertion	<b>Test-3</b>	Ch. 4: 2, 12-17
13		4.10, 4.11 Using D-Bug Functions 6.6 – 6.10 Clock Monitor, COP, Resets	Project	Ch. 4: 18-20 Ch. 6: 9-13
14		7.10, 7.11, 7.13 Keypad, D/A Converter, Key Wakeups	Project	Ch. 7: 8-13 In Assem. Lang.
15		7.13 Continued, DMA, Evaluation	Project	Ch. 7: 17,18 In Assem. Lang.
16			<b>Final Exam Project due</b>	

**MIAMI UNIVERSITY LEARNING COMMUNITY:**

Miami University is committed to fostering a supportive learning environment for all students irrespective of individual differences in gender, race, national origin, religion, handicapping condition, sexual preference, or age. Students should expect, and help create, a learning environment free from all forms of prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences are behaviors that undermine our learning community. If such behaviors occur in class or lab, please seek the assistance of your instructor or department chair.