Des Moines Area Community College

Course Information – EFFECTIVE Aug. 2006

Acronym/Number **ELT 611** **Historical Ref.** **ELHT 340**

Title **Microprocessors**

Credit Breakout	**2**	**2**	**0**	**0**	**0**
	(credit	**lecture**	**lab**	**practicum**	**work experience)**

PREREQUISITE(S): ELT 325, ELT 326

COREQUISITE(S): ELT 612

COURSE DESCRIPTION:
This course covers two major areas of microcomputers and microprocessors. The first is an investigation of the specific architecture of microprocessors and fundamental microcomputer hardware. The second area is software and is concerned with the specific machine and assembly level instruction including instructions for common routines and program structures.

COURSE COMPETENCIES:
During this course, the student will be expected to:

1. Relate a microcomputer and microprocessor
   - 1.1 Define a microcomputer and a microprocessor
   - 1.2 State how the microcomputer and microprocessor have evolved
   - 1.3 Identify examples of microcomputer and microprocessor applications
   - 1.4 Draw an overall fundamental block diagram of a basic microcomputer
   - 1.5 State the purpose of each microcomputer block
   - 1.6 List the three common computer buses and indicate them as being either uni-directional or bi-directional
   - 1.7 Describe the Computer Bus concept and the reason for its popular use
   - 1.8 Describe the fundamental principles of computer operation

2. Compare computer number systems
   - 2.1 Define bits, nybbles, bytes, words, double words
   - 2.2 Show numbers in decimal, binary, octal, and hexadecimal form
   - 2.3 Convert numbers between the following number systems: decimal, binary, octal, hexadecimal

3. Generate standard flow charts for computer programs
   - 3.1 Draw the popular standard flow chart symbols
   - 3.2 Define the flow chart symbols
   - 3.3 Demonstrate proper flow chart techniques by drawing a flow chart of a computer program
   - 3.4 Describe the difference between high level and low level flow charting

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4. Contrast hand assembly and machine assembly of computer programs
   - 4.1 Write source programs using hand assembly
   - 4.2 Compile object code and list files using hand assembly
   - 4.3 Write source programs using a text editor
   - 4.4 Compile object codes and list files using a machine assembler

5. Understand branch control group instructions for computer programs
   - 5.1 List the status flags, their bit position in the flag register, their functional meaning, and an example of common use.
   - 5.2 Describe the microprocessor's two-step decision making process
   - 5.3 Identify the Conditional Branch instructions and related flags.
   - 5.4 Predict the outcome of a conditional branch decision making process relative to the value of the flag itself or based on the results of the math/logic computation.
   - 5.5 Show how conditional branch instructions are used for generating time delays, loops, and nested loops.
   - 5.6 Describe the difference between Jumps and Calls
   - 5.7 Describe the difference between routines and subroutines
   - 5.8 Describe Stack operation and Stack rules
   - 5.9 Illustrate Stack activity for Pushes, Pops, Calls and Rets.

6. Compose macros and subroutines for computer programs
   - 6.1 Describe how to make a subroutine transparent
   - 6.2 Illustrate nested subroutines
   - 6.3 Define a macro
   - 6.4 Show how a macro is used in a computer program
   - 6.5 Compare the advantages/disadvantages of using macros vs. subroutines
   - 6.6 Illustrate parameter passing methods for macros and subroutines

9. Summarize the operation of the central processing unit (CPU)
   - 9.1 List the 8085 microprocessor modes of operation
   - 9.2 Identify all the pins of the 8085 microprocessor and the function of each pin
   - 9.3 Discuss each 8085 mode including purpose and applications
   - 9.4 Describe the following 8085 timing intervals
     1. Instruction cycles
     2. Machine cycles
     3. States
   - 9.5 Show how to determine the number of machine cycles for any given 8085 instruction
   - 9.6 Explain the 8085 Machine Cycle Analysis Chart on a machine cycle basis or state-by-state basis
   - 9.7 Explain the 8085 State Transition Diagram relative to the 8085 modes of operation
   - 9.8 Describe the concept of multiplexing relative to the 8085s address bus, data bus, and the use of an address latch

10. Analyze the operation of the M85 trainer's CPU section

7. Summarize computer memory and data storage concepts.

7.1 Define the following memory devices.
- 7.1.1. ROM, PROM, EPROM, RAM
- 7.1.2. Magnetic Core and Magnetic Bubble Memory

7.2 Contrast each of the following.
- 7.2.1. Volatile vs. Non-Volatile memory
- 7.2.2. Primary vs. Secondary memory
- 7.2.3. Static RAM vs. Dynamic RAM

7.3 Computer the number of memory cells and the size or each cell (number of bits) when given a specific IC memory device

8. Service I/O peripheral devices via polling.
- 8.1 Define polling and external flags.
- 8.2 Illustrate both hardware and software techniques for continuous polling and periodic polling.

9. Service I/O peripheral devices using interrupts.
- 9.1 Define a computer 'Interrupt'.
- 9.2 Describe how the picroprocessors performs interrupt handling.
- 9.3 Describe the use of the restart instructions for interrupt handling.
- 9.4 Illustrate both hardware and software techniques for vectored interrupts, scanned/polled interrupts and daisy-chained interrupts.
- 9.5 Describe how to allow for "nested interrupts".
- 9.6 Illustrate how to "mask" interrupts and set up "priority" interrupts

10. Communication methods.
- 10.1 Parallel (data bus).
- 10.2 Balanced vs. unbalanced serial.
- 10.3 RS-232.
- 10.4 RS-485.
- 10.5 Misc. Serial: I2C, SPI, CAN.

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COMPETENCIES REVIEWED AND APPROVED BY; Al Trickey

DATE: __10/05_____

FACULTY:
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6.

Preparation
Effective date: August, 2006

by: Jerry Marlow

Campus: A B C U N W OC

extension: 6689

Revision(s): 11/97; 10/05;