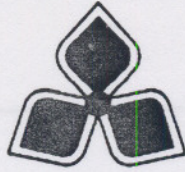# SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE MARIE, ON

COURSE OUTLINE

Course Title: COMPUTER INTERFACING

Code No.: ELN302   **Semester:** 6

Program: ELECTRICAL/ELECTRONICS ENG. TECHNOLOGY

Author: DOUG FAGGETTER

Date: JAN. 1998   **Previous Outline Date:** JAN. 1994

Approved: *L. DeRosario*   *Jan. 6/98*
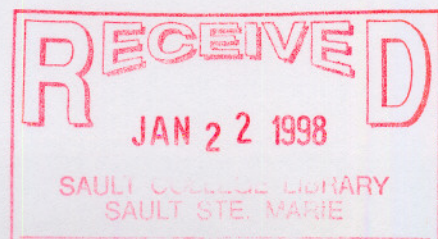   **Dean**   **Date**

Total Credits: 5   **Prerequisite(s): CET228, CET331**
Length of Course: 16   **Total Credit Hours: 80**

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COMPUTER INTERFACING	ELN302

PHILOSOPHY/GOALS:
STUDENTS WILL STUDY THE ARCHITECTURE AND PROGRAMMING OF MICROCONTROLLERS IN COMPUTER INTERFACING APPLICATIONS. LAB ACTIVITIES INVOLVING COMPUTER INTERFACING TO HARDWARE AND THE ASSOCIATED SOFTWARE REQUIREMENTS WILL SUPPORT THE THEORY.

STUDENT PERFORMANCE OBJECTIVES:
UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

1. IDENTIFY THE MAJOR COMPONENTS IN THE ARCHITECTURE OF A MICROCONTROLLER.

2. IDENTIFY THE FUNCTION OF THE VARIOUS REGISTERS IN THE MICROCONTROLLER.

3. BE ABLE TO USE THE INSTRUCTION SET OF THE MICROCONTROLLER TO WRITE ASSEMBLY LANGUAGE PROGRAMS.

4. USE THE ON-BOARD MONITOR PROGRAM OF THE MICROCONTROLLER.

5. INTERFACE ANALOG SIGNALS TO THE MICROCONTROLLER.

6. ACCESS THE MICROCONTROLLER PERIPHERALS AND TIMER.

7. PROGRAM THE MICROCONTROLLER USING A HIGH LEVEL LANGUAGE ("C"LANGUAGE).

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TOPICS TO BE COVERED

1. M68HC11 MICROCONTROLLER

2. M68HC11 REGISTERS

3. M68HC11 ADDRESSING MODES

4. M68HC11 INSTRUCTION SET

5. EVB MONITOR COMMANDS

6. ASSEMBLER DIRECTIVES

7. INTERFACING ANALOG SIGNALS

8. OUTPUT PERIPHERALS

REQUIRED TEXTBOOK:

DATA ACQUISITION AND PROCESS CONTROL WITH THE M68HC11
MICROCONTROLLER
BY- DRISCOLL, COUGHLIN, VILLANUCCI
(MACMILLAN PUBLISHING CO. 1994)

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LEARNING ACTIVITIES   **REQUIRED RESOURCES**

1   M68HC11 MICROCONTROLLER   TEXT CHAP 1
1.1 M68HC11 FAMILY
1.2 PACKAGE STYLE AND PIN ASSIGNMENTS
1.3 PORT REPLACEMENT UNIT
1.4 MEMORY MAP

2   M68HC11 PROGRAMMER'S MODEL AND   TEXT CHAP 2
     ADDRESSING MODES
2.1 ACCUMULATOR A AND B
2.2 ACCUMULATOR D
2.3 CONDITION CODE REGISTER
2.4 INDEX REGISTERS
2.5 STACK POINTER
2.6 PROGRAM COUNTER
2.7 ADDRESSING MODES
2.8 INTERRUPTS

3   M68HC11 INSTRUCTION SET   TEXT CHAP 3
3.1 LOAD, STORE, TRANSFER AND EXCHANGE DATA
3.2 ARITHMETIC INSTRUCTIONS
3.3 MULTIPLY AND DIVIDE INSTRUCTIONS
3.4 LOGICAL OPERATION INSTRUCTIONS
3.5 DATA TESTING AND BIT MANIPULATION INSTRUCTIONS
3.6 SHIFT AND ROTATE INSTRUCTIONS
3.7 CONDITION CODE INSTRUCTIONS
3.8 BRANCH INSTRUCTIONS
3.9 JUMP INSTRUCTIONS
3.10 SUBROUTINE CALLS AND RETURNS
3.11 STACK POINTER AND INDEX REGISTER INSTRUCTIONS
3.12 INTERRUPT HANDLING INSTRUCTIONS

4   EVB COMMANDS, UTILITY ROUTINES AND   TEXT CHAP 4
     ASSEMBLER SOFTWARE
4.1 MONITOR COMMANDS
4.2 ASSEMBLER DIRECTIVES
4.3 SOURCE AND ASSEMBLER FILES
4.4 DOWNLOADING FILES

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5   INTERFACING ANALOG SIGNALS TO THE M68HC11   TEXT CHAP 5 5.1
    ANALOG TO DIGITAL CONVERTERS
5.1 PORT E
5.2 A/D REGISTERS
5.3 ANALOG INTERFACE

6   OUTPUT PERIPHERALS AND SOFTWARE CONTROL   TEXT CHAP 6
6.1 I/O PORTS
6.2 TIMER
6.3 TIMER OVER FLOW
6.4 OUTPUT COMPARE FUNCTIONS
6.5 INPUT CAPTURE FUNCTIONS

7   OTHER INTERFACING APPLICATIONS
7.1 USE OF THE "C" COMPILER TO PROGRAM THE
     MICROCOMPUTER
7.2 68000 APPLICATIONS
7.3 IEEE 488 BUS
7.4 PROGRAMING THE PARALLEL PORT OF THE IBM PC

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EVALUATION PROCEDURES

1. TESTING WILL CONSIST OF BOTH THEORY AND PRACTICAL COMPONENTS. AT LEAST ONE WEEK NOTICE WILL BE GIVEN FOR ALL MAJOR TESTS.

2. QUIZZES MAY BE GIVEN FROM TIME TO TIME WITHOUT NOTICE.

3. THE GRADING WEIGHT WILL BE:

   ```
   THEORY - 50%
   LAB    - 50%
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   TOTAL  - 100%
   ```

4. THE GRADING SYSTEM WILL BE AS FOLLOWS:

   ```
   A+ = 90 - 100%
   A  = 80 - 90%
   B  = 70 - 79%
   C  = 55 - 69%
   R  = REPEAT
   ```

5. THE STUDENT MUST ATTAIN A 55% IN BOTH THEORY AND LAB PORTIONS TO SUCCESSFULLY COMPLETE THE COURSE.

SPECIAL NOTES:

1. LAB ATTENDANCE IS COMPULSORY AND IS INCLUDED IN THE EVALUATION PROCESS.

2. THE INSTRUCTOR RESERVES THE RIGHT TO MODIFY THE COURSE TO MEET THE NEEDS OF THE STUDENTS.