

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



**COURSE OUTLINE**

**Course Title: MICROPROCESSOR CIRCUITS AND APPLICATIONS**

**Code No.: CET 228-5                      Semester: FOUR**

**Program: ELECTRICAL/ELECTRONIC  
TECHNICIAN/TECHNOLOGY**

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**Date: 01/1999                      Previous Outline Date: 12/98**

**Approved: K. DeRosario                      Jan. 11/99  
Dean    Date**

**Total Credits: 5                                      Prerequisite(s):**  
**Length of Course: 16 weeks                      Total Credit Hours:**

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& Technology Studies, (705) 759-2554, Ext. 642.

Microprocessor Circuits And Applications  
COURSE NAME

CET 228  
COURSE NUMBER

**I. COURSE DESCRIPTION:**

This course introduces students to 80x86 Assembly language programming. Associated number systems, microprocessor architecture and the 80x86 Assembly language instruction set will be covered. Assembly language programming skills will be developed to enhance computer system hardware and software concepts.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

(Generic Skills Learning Outcomes placement on the course outline will be determined and communicated at a later date.)

Upon successful completion of this course the student will demonstrate the ability to:

1) Utilize numbering systems associated with microprocessor operation.

Potential Elements of the Performance:

- convert between decimal, binary, octal and hexadecimal
- perform arithmetic operations using binary, octal and hexadecimal
- interpret ASCII code

2) Describe the architecture of the 80x86 microprocessor.

Potential Elements of the Performance:

- list the major components of a computer system and describe their functions
- list the major components of the CPU and describe the purpose of each
- define common computer terms such as RAM, ROM, K, byte, etc.
- describe the history of development of microprocessors
- describe the evolution of the INTEL 80x86 family of microprocessors
- describe the registers of the 80x86 microprocessors

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)**

3) Write, assemble, link and run simple Assembly language programs.

Potential Elements of the Performance:

- describe machine language, Assembly language and how the two are related
- describe what is meant by 'low-level languages' and 'high-level-languages', giving examples of each
- describe the components of an Assembly language instruction
- describe the components and structure of an Assembly language program
- describe how a program is executed
- describe the flag register and the purpose of each bit
- list and describe the addressing modes of the 80x86
- use DEBUG to test/run Assembly language instructions
- describe the structure of a 'good' program
- use the DOS editor to write an Assembly language program and save it as a .asm file
- use MASM and LINK to assemble and link the .asm file

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**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE  
(Continued)**

4) Write Assembly language programs to perform specific tasks relating to data manipulation.

Potential Elements of the Performance:

- use appropriate interrupts to input characters from the keyboard and output characters to the screen
- use control transfer instructions to appropriately sequence instructions in a program
- use subroutines in Assembly language programming
- describe the different data types used in Assembly language programming
- write Assembly language programs to perform arithmetic operations on signed and unsigned integer numbers
- write Assembly language programs utilizing logic instructions
- write Assembly language programs to sort characters and/or strings
- write Assembly language programs to convert from hex to decimal and vice versa

5) Program the 8253/54 PIT (programmable interval timer).

Potential Elements of the Performance:

- describe the functions of the 8253/54 PIT
- write Assembly language programs to produce specific sounds

6) Use the serial and parallel ports for I/O tasks

Potential Elements of the Performance:

- describe the basics of serial communication with microprocessors
- describe the basics of parallel port communication with microprocessors
- use the series or parallel port to interface a PC with another piece of equipment

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**III. TOPICS:**

- 1) Numbering systems
- 2) Architecture of the 80x86 microprocessor
- 3) Writing simple Assembly language programs
- 4) Data manipulation programming
- 5) 8253/54 programmable interval timer
- 6) Serial and parallel port interfacing

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

The 80x86 IBM PC and Compatible Computers (Volumes I & II) Assembly Language, Design, and Interfacing Second Edition by M. A. Mazidi and J. G. Mazidi

**V. EVALUATION PROCESS/GRADING SYSTEM**

The final grade for the course will be determined as follows:

THEORY	50%
ASSIGNMENTS & PRACTICAL TEST(S)	50%

The grading system used will be as follows:

A+	90 to 100%
A	80 to 89%
B	70 to 79%
C	60 to 69%
R	< 60% (repeat course)

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## **VI. SPECIAL NOTES:**

- In order to maintain a passing grade the student must obtain a minimum 55% average in both the theory and assignment/practical portions of the course as well as an overall average greater than or equal to 60% (ie. a 100% theory average with a 50% assignment/practical average will result in an R grade).
- If a student misses a test he/she must have a valid reason (ie. medical or family emergency). In addition, the school must be notified before the scheduled test sitting. The student should contact the instructor involved. If the instructor cannot be reached leave a message with the Dean's office or the College switchboard. If this procedure is not followed the student will receive a mark of zero on the test with no rewrite option.
- Special Needs  
If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.
- Retention of Course Outlines  
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.
- Disclaimer for Meeting the Needs of the Learners
- Substitute Course Information is available at the Registrar's Office.

## **VII. PRIOR LEARNING ASSESSMENT**

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following: