SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE: Microprocessor Circuits and Applications

CODE NO. :   CET-228   **SEMESTER:**   Four

PROGRAM: Electrical / Electronic / Instrumentation Technician

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Modified by: Ed Sowka

DATE: 02-2005   **PREVIOUS OUTLINE DATED:**   01-2003

APPROVED:

_____   _____
                          DEAN   **DATE**

TOTAL CREDITS: 5

PREREQUISITE(S):   ELN115
CET110

HOURS/WEEK: 4

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I.   COURSE DESCRIPTION:

This course introduces the student to 80x86 Assembly Language
Programming and Debugging. Intel – based microprocessor architecture,
instruction set, 80x86 Microsoft Assembler and DEBUG (DOS and
Windows) are studied. Programming skills will be developed to enhance
computer system hardware and software concepts.

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1.   Describe and Understand the Architecture of the Intel Microprocessor
      and Personal Computer.

      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
- describe the history of development of microprocessors
- describe the evolution of the INTEL 80x86 family of
  microprocessors
- describe the registers and their function, of the 80x86
  microprocessors

2.   Use DEBUG, to view memory, write simple programs, and debug
      simple programs.

      Potential Elements of the Performance:

- Understand the basic DEBUG commands and syntax
- Demonstrate how to use DEBUG to view the contents of
  memory and CPU registers.
- Demonstrate the use of DEBUG to assemble, run/test and
  troubleshoot simple assembly language programs

3. Code, assemble, link and execute, simple assembly language programs, using Microsoft Assembler (MASM).

   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 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

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

III. TOPICS:

1. Review of Number Systems and Arithmetic Operations
2. Intel Microprocessor Architecture / PC Architecture
3. Introduction to Assembly Language and DEBUG
4. MASM Structure and Programming
5. Data Manipulation
6. Hardware Programming (8253/54 PIT, Serial / Parallel Port)

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- 3 – 1.44 MB 3.5" Floppy Disks or other removeable storage device
- CET228 Course Notes
- Instructor Handouts (To be supplied by Instructor)
- Internet Resources as outlined by the Instructor

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade will be derived as follows;

- 50% - Theory (2 or 3 Tests and Several Quizzes)
- 50% - Practical (Practical Tests and Assignments)

The following semester grades will be assigned to students in postsecondary courses:

Grade	Definition	Grade Point Equivalent
A+	90 - 100%	4.00
A	80 - 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50-59%	1.00
F (Fail)	49% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field/clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/ clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

VI.   SPECIAL NOTES:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 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 postsecondary institutions.

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Plagiarism:
Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

- Attendance to lab activities is compulsory, unless discussed with the instructor in advance of the absence and the absence is for a medical or family emergency. A **deduction of 2% per Lab hour missed**, will be imposed on the final lab mark.
- Your attendance to all classes, and your final grade are directly related. A **deduction of 1% per theory hour missed**, will be imposed.
- Any student that is absent for a test, will be required to provide a doctors' note immediately upon returning. Failing to do so will result in a grade of 0% being assigned to the missed test.
- Tests, quizzes and other activities, will not be scheduled on an individual basis, unless it is for a medical or family emergency.
- Disruptions to theory classes, such as lateness, are not acceptable and will be dealt with on an individual basis.

All Lab Reports are due at the start of the following weeks Lab Class unless otherwise stipulated by the instructor. A **penalty of 10% per day** will be assessed for late submissions (Weekends included).

All Lab Reports must be submitted in a Duo-Tang cover

All other required submissions will be assessed a late penalty of **5% per day** (Weekends included).

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VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should
consult the professor. Credit for prior learning will be given upon
successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing)
should obtain a direct credit transfer form from the Dean's secretary.
Students will be required to provide a transcript and course outline related
to the course in question.