SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

MICROCOMPUTER SYSTEMS
Course Title: _____

CET 225-5
Code No.: _____

ELECTRICAL & ELECTRONIC TECHNICIAN
Program: _____

FOUR
Semester: _____

NOVEMBER, 1986
Date: _____

NORM BARKER
Author: -

New:___X____ Revision:_____

APPROVED: _____   ___86/10/10_____
          Chairperson   Date

CALENDAR DESCRIPTION

MICROCOMPUTER SYSTEMS   CET 225-5
_____   _____
Course Name   Course Number

PHILOSOPHY/GOALS:

This course will enhance the student's understanding of microprocessor
applications and the peripheral devices used to support them. As well,
this course will provide a knowledge of the PDP 11 family of computers
and develop student skills in programming, using machine and assembly
language.

The RSX 11 operating system will be used and programming of a variety
of peripheral devices will be included.

METHOD OF ASSESSMENT (GRADING METHOD):

The primary means of evaluating student performance will be the written
test. Tests will be announced at least one week in advance and will
constitute 80% of the final mark. The remaining 20% will be determined
by quizzes (unannounced) and laboratory work. Laboratory exercises or
projects specified by the instructor must be correctly completed and
submitted, on schedule, for evaluation.

TEXTBOOK(S):

    Programming in Assembly Language: MACRO-11 - Edward F. Sowell
    Introduction to Microcomputing - Newell

CET 225-5

MICROCOMPUTER SYSTEM OBJECTIVES

GENERAL OBJECTIVES:

This course will enhance the student's knowledge of microprocessor theory,
practice and applications, together with representative peripheral devices.
Knowledge of the detailed internal operation will be gained through study
of the M6800 monitor program in READ ONLY MEMORY (ROM). Peripheral devices
will include the PIA, ACIA and PTM of the M6800 system.

The course will also provide a knowledge of the PDP 11 computer and its
RSX 11 operating system. The student will develop skills in programming
the PDP 11 and several peripheral devices using machine and assembly
language.

TEXTS:

> Introduction to Microcomputer by Newell
> Programming in Assembly Language: MACRO 11 by Edward F. Sowell

REFERENCES:

> RSX 11 Guide to Programming Development - DEC
> PDP 11 MACRO 11 Language Reference Manual
> IAS/RSX 11 ODT Reference Manual
> IAS/RSX 11 I/O Operations Manual

ASSESSMENT:

The primary means of evaluating student performance will be the written
test. Tests will be announced at least one week in advance and will
constitute 80% of the final grade. The remaining 20% will be determined
by means of unannounced quizzes and laboratory work. Laboratory exercises
or projects specified by the instructor must be correctly completed and
submitted, on schedule, for evaluation.

Final letter grades will be awarded as follows:

80% or higher	-	"A"
66 to 79%	-	"B"
55 to 65%	-	"C"
Less than 55%	-	"R"

SPECIFIC OBJECTIVES

BLOCK 1 - MICROPROCESSOR INPUT/OUTPUT TECHNIQUES

1. Describe and implement the 6821 Peripheral Interface Adapter (PIA) in
    all of its operating modes.

2. With the aid of a block diagram recalled from memory, describe the
    6850 Asynchronous Communications Interface Adapter (ACIA), its
    internal architecture and programming in M6800 based system.

3. Discuss techniques of I/O servicing through polling and interrupt
    servicing and write M6800 programs to handle them.

4. Describe the registers and modes of operation of the M6840 Programmable
    timer module and implement the timer in its frequency measurement and
    signal generator modes.

5. Describe the operation of the A-D converter (ACD0804) and D-A converter
    (DAC0800) and write programs to employ them under M6800 control.

BLOCK 2 - PDP-11 MACHINE LANGUAGE PROGRAMMING

At the end of this block the student shall be able to:

1. Describe the addressing modes used in the PDP-11 and be able to code
    PDP-11 programs into their octal code.

2. Write programds using the PDP-11 to solve a variety of problems
    including arithmetic programs, and programs using subroutines and the
    stack.

3. Use the EDT editor program to create MACRO-11 source files for the
    programs.

4. Assemble the source programs, and link them with the ODT debugging
    program.

5. Use the ODT debugger to test and debug programs.

BLOCK 3 - INPUT-OUTPUT PROGRAMMING

At the end of this block the student shall be able to:

1. Use MACRO-11 on the RSX11 operating system to write programs
    utilizing disk files and the input terminal.

2. Describe the organization of the following I-O devices:

        a) The console terminal
        b) The Analog to Digital converter
        c) The Digital to Analog converter
        d) The Real-Time Clock
        e) The Digital I-O unit

3. Write programs to use the I/O devices listed in item #2 above.