SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: INTERFACING

Course No.: CET302

Program: COMPUTER ENGINEERING TECHNOLOGY

Semester: 6

Date: JANUARY, 1990

Author: GERRY DAVIES

New: _____ Revision: __X__

APPROVED: _____ _____

Chairperson Date

CET 302

INTERFACING

OBJECTIVES

GENERAL OBJECTIVES

The objectives of this course are to study the general techniques used in computer interfacing, expanding upon the fundamentals learned in CET228, " Microcomputer Circuits and Applications" and to carry out practical exercises with a variety of microcomputer systems. These lab activities will include a Q-BUS interface for a PDP-11 computer, an IBM-PC interface project, an IEEE-488 bus project, and an EPROM programmer exercise. In addition, students will learn to use test equipment such as logic analyzers and signature analyzers in troubleshooting and development.

TEXTBOOK: "HARDWARE AND SOFTWARE INTERFACING FOR THE IBM PC" by JEFFERY ROYER

LENGTH OF COURSE: 6 HOURS PER WEEK FOR 1 SEMESTER (16 WEEKS)

METHOD OF ASSESSMENT:

WRITTEN TESTS AND QUIZZES	65%
LAB PROJECTS AND ASSIGNMENTS	35%

The percentage of assessment for tests and projects may vary slightly from the figures given above.

GRADING SCHEME

COURSE: CET302

1. TESTS

Written tests will be conducted as deemed necessary. They will be announced about one week in advance. Quizzes may be conducted without advance warning.

2. GRADING SCHEME

A+	90	-	100%	Outstanding achievement
A	80	-	89%	Above average achievement
B	70	-	79%	Average Achievement
C	55	-	69%	Satisfactory Achievement

I Incomplete: Course work not complete at Mid-term. Only used at mid-term.

R Repeat

X A temporary grade that is limited to instances where special circumstances have prevented the student from completing objectives by the end of the semester. An X grade must be authorized by the Chairman. It reverts to an R if not upgraded in an agreed-upon time, less than 120 days.

4. UPGRADING OF INCOMPLETES

When a student's course work is incomplete or final grade is below 55%, there is the possibility of upgrading to a pass when the student's performance warrants it. Attendance and assignment completion will have a bearing on whether upgrading will be allowed. A failing grade on all tests will remove the option of any upgrading and an R grade will result. The highest grade on re-written tests or assignments will be 56%.

The method of upgrading is at the discretion of the teacher and may consist of one or more of the following options: assigned make-up work, re-doing projects, re-doing of tests, or writing a comprehensive supplemental examination.

BLOCK 1: COMPUTER BUSES

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

1. Describe the nature of a computer bus and its functions.

2. Describe the handshake protocol of the PDP-11 Q-BUS interface circuits, and describe the operation of the DC003, DC004, and DC005 family of interface chips for the QBUS.

3. Describe the operation Q-BUS circuits during given types of cycles or during the processing of an interrupt.

4. Be able to describe the principles of operation and important characteristics of a variety of bus interfaces including the S-100 bus, the STD bus, the MULTIBUS, the UNIBUS, the SCSI Bus, and others as assigned.

5. Describe the IBM-PC I/O channel, and the how to interface to it.

BLOCK 2: MEMORY SYSTEMS AND DMA

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

1. Given circuit diagrams, describe the operation and organization of the memory system in an IBM-PC.
2. Discuss the general operation of a DMA controller.
3. Describe the operation of the 8237A DMA Controller in an IBM-PC.
4. Describe the DMA protocol used in the PDP-11 system.
5. Given circuit diagrams, describe the operation of a PDP-11 Q-BUS DMA interface.
6. Describe the memory management and executive functions of the IBM pc and write programs using them.

BLOCK 3: PARALLEL INTERFACING AND THE IEEE-488 BUS

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

1. Describe the IEEE-488 bus signals, and the protocol used to transfer information on this bus.
2. Describe the operation and programming requirements of various interface chips for the IEEE-488 bus such as the Intel 8291 and the Motorola 68488.
3. Describe the operation of the IBV11 IEEE-488 bus interface for the PDP-11.
4. Write programs in MACRO-11, FORTRAN or BASIC to control the operation of frequency counters, digital multimeters, and frequency synthesizers using the IEEE-488 bus in an ATE system.

BLOCK 4 MAGNETIC DEVICES

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

1. Describe the operation and use of phase-locked loops in digital recording.

2. Discuss the various methods of encoding digital information magnetically on disks and tapes.

3. Discuss the problem of data recovery when reading data from disk.

4. Given circuit diagrams, describe the operation of a floppy disk interface, and a floppy disk drive.

5. Describe the operation and programming of a typical floppy disk controller chip.

6. Discuss the operation of, and write programs to control, PDP-11 magnetic tape drives.

7. Describe the method of file management on the IBM-PC diskette, and write programs to utilize it.

BLOCK 5 DISPLAY TECHNIQUES

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

1. Describe the methods of displaying data on colour and black and white raster-scan CRTs.

2. Describe the typical components of a CRT display interface.

3. Describe the operation of the MC6845 CRT controller chip and its application in typical systems such as the IBM-PC.

4. Given circuit diagrams, describe the operation of the D2 kit CRT controller board.

5. Write programs to initialize the CRT controller and display data on the CRT.

6. Describe the operation of the MC6847 colour video display controller.

7. Describe the features of various graphics adapter standards in use in personal computer systems.

BLOCK 6 INTERFACE SOFTWARE

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

1. Discuss the use of device drivers on the IBM pc.

2. Describe the operation of a typical device driver for a device such as a terminal or floppy disk controller.

3. Describe the requirements of a device driver, and the steps required to write one.

4. Write a device driver for an IBM PC peripheral.