



NIAGARA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

Course Information Sheet

Course Number: CTEC1530

Credits: 6

Course Name: MICROCOMPUTER DESIGN

Scheduled Classroom Hrs/Wk: 3 Hrs.Lect. &
3 Hrs. Lab

COURSE DESCRIPTION:

This course presents the principles involved in the design of a typical microcomputer system. Topics include an in-depth study of assembly language programming, microprocessor interfacing, expansion and design methodology; including both hardware and software components. Emphasis will be made on I/O interfacing as well as programming to support the interface (including interrupt-service routines). Using a logic analyzer students will study bus timing.


Offered in the following programs/term:

Computer Engineering Technology/Term 7

Prepared by: Mark Csele/Michael Boldin

Coordinator: Mike Boldin

Approved by: _____


Dr. Christine Bradaric-Baus, Dean

Date: November 2006

Division: Technology

Current Academic Year: 2006/2007

Term: 2007W

Requisite Information:

1. To register in this course, the following course(s) must have been successfully completed:

Prerequisite No.	ELNC1331	Prerequisite Name:	Digital Circuits II
Prerequisite No.	ELNC1330	Prerequisite Name:	Linear Circuits and Applications
	or		Or
	ELNC1342		Linear Circuits I
Prerequisite No.	CTEC1435	Prerequisite Name:	Computer Programming II

2. To register in this course, the following course(s) must be taken at the same time:

Co-requisite No.	n/a	Co-requisite Name:	n/a
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3. This course is a required pre-requisite for the following course(s):

Course Number:	CTEC1630	Course Name:	Embedded Systems Design
Course Number:	CTEC1631	Course Name:	Digital Signal Processing

4. This course is considered equivalent to the following course(s):

Course Number: n/a Course Name: n/a

Promotion and Graduation Requirements:

Certificates and Diplomas

A minimum grade of 50% is required to proceed from a pre-requisite course to the next course. A minimum grade of 50% in all courses and a weighted average of 60% are required for promotion to the next level or year of the program and for graduation. (Please refer to the Niagara College practices on Grading and the Transcript and Graduation and Promotion Requirements.)

TEXTBOOKS and MATERIALS REQUIRED:

Mazidi & Mazidi

THE 80x86 IBM PC & COMPATIBLE COMPUTERS Volumes 1&2; 4th Edition
Prentice-Hall Publ.; ISBN 0-13-061775-X

SUPPORT MATERIALS, REFERENCE BOOKS:

Tool Kit, including soldering iron with a fine tip, wire cutters, wire strippers, needle-nose pliers and screwdrivers and wire wrapping tool.

Clip-to-clip and oscilloscope (BNC-to-clip) leads.

Several 3-1/2" diskettes or USB flash drive.

TYPES OF EVALUATION USED IN THIS COURSE AND THEIR WEIGHT:

<u>TYPE</u>	<u>WEIGHT</u> (percentage of final grade):
Term Tests (min. 2)	30%
Labs/Projects/Assignments	30%
Final Exam (Practical and Theory)	40%

Note: Specific evaluation details by unit on pp. 3-5

COURSE GOALS (general student learning outcomes):

1. Create programs in assembly language that incorporate input/output operations on a microcomputer system.
2. Use a commercial assembler and debugger to create well-designed programs.
3. Design a computer input/output circuitry, utilizing both general and special-purpose digital and analog circuitry.
4. Specify the most effective I/O method to use for a given situation.
5. Understand the design of a simple computer system incorporating CPU, memory and input/output circuitry.
6. Include operating system calls in programs.
7. Create interrupt-service routines to handle interrupt-driven I/O.

SPECIFIC CURRICULUM OBJECTIVES BY UNIT:**UNIT NAME: Introduction to Microprocessor-based Design****A. Curriculum Objectives:**

1. Provide the student with a history of microcomputer developments.
2. Describe the purpose of all major components making up a microcomputer system, with emphasis on the Intel 80x86 line of microprocessors.
3. Describe the sequence of events within the microcomputer during the execution of an assembly language instruction.

B. Evaluation of Course/Component Curriculum Objectives:

Assignment, test

UNIT NAME: Assembly Language**A. Curriculum Objectives**

1. Using an assembler, develop, test and debug programs incorporating a wide range of assembler instructions.
2. Make effective use of debugging techniques to locate and correct syntax and logical errors.
3. Provide proper program documentation for assembly language programs.
4. Design proper software/hardware testing procedures.

B. Evaluation of Course/Component Curriculum Objectives:

Assignments, test, and labs

UNIT NAME: The IT-10 Interface Trainer**A. Curriculum Objectives:**

1. Describe the operation of each of the Trainer's components.
2. Test the IT-10 Trainer using a personal computer.
3. Develop application software that utilizes the Trainer's I/O hardware including the 8255, 8235, and 8259 components.
4. Interface external signals to the Trainer for data acquisition and control applications.

B. Evaluation of Course/Component Curriculum Objectives:

Assignment, test, labs, project

UNIT NAME: Microcomputer System Design**A. Curriculum Objectives:**

1. Recognize the characteristics of different memory types.
2. Identify and be able to design memory and I/O interface circuits including address decoding, buffers etc.
3. Understand address and data busses and how they are used for a computer system.
4. Understand signal timing and be able to use a logic analyzer to debug hardware interfaces.

B. Evaluation of Course/Component Curriculum Objectives:

Assignments, test, labs, project

UNIT NAME: Input/output Design**A. Curriculum Objectives:**

1. Design I/O and memory-mapped I/O ports.
2. Use standard logic components as I/O devices.
3. Write an interrupt service routine, running under DOS.
4. Explain the operation and advantages of direct memory access (DMA transfer).
5. Prepare a report that includes the design (hardware and software) specifics and tests performed.

B. Evaluation of Course/Component Curriculum Objectives:

Assignments, test, labs, project

UNIT NAME: Design Project**A. Curriculum Objectives:**

1. Design a circuit that interfaces with a personal computer to convert analog voltages into digital form.
2. Research how parallel ports (SPP,ECP, EPP) work.
3. Create a properly laid out schematic diagram of the circuit.
4. Layout and construct the circuit using a combination of wirewrap and soldering techniques.
5. Write diagnostic test programs for the circuit.
6. Write the appropriate application software using C and/or assembly language programming.
7. Debug the hardware and software.

B. Evaluation of Course/Component Curriculum Objectives:

Assignments, test, labs, project

COURSE ATTENDANCE POLICY:

1. Attendance at all labs is mandatory. Lose 5% for each unauthorized lab absence, lose 1% for each late lab arrival.
2. Late labs, projects, and assignments are penalized at 10% per day late and receive a 0% after 5 days late.
3. All labs and projects must be submitted and completed to the satisfaction of the instructor by the end of term (regardless of the fact they may receive a zero from being late) or a failure in the course will result.
4. Students must pass the theory (testing) and practical (lab/ project) portions of the course separately in order to pass the course. Failure to pass either portion (theory or practical) will result in a maximum final mark of 45%.

12/5/06