SCHOOL OF ENGINEERING AND APPLIED SCIENCE
DEPARTMENT OF ENGINNERING TECHNOLOGY

ENT – 297	**Microprocessor Technology II**	**3**
Course Number	Title	Credit hours

DESCRIPTION:
Advanced study of microprocessor application for commercial and industrial use. Emphasis on microcomputer architecture interface to personal computers and peripheral devices such as printers, modems, D to A and A to D converters, and programmable logic devices. Applications of specific devices such as single chip embedded controllers, USB interface devices, wireless interface devices, Parallel Peripheral Interfaces, and Industrial Machine Controllers.

PREREQUISITES: ENT 293 Digital Switching and ENT 295 Microprocessor Technology I

TEXT AND COURSE MATERIALS:
Texas Instruments EZ430-F2013 Microcontroller Developments Tools and CD Text
OrchEd Circuit Lab Platform Trainer (TR-CLP07)
OrchEd 430 Embedded Controller Course Package (CP-EDC08)

COURSE OBJECTIVES:
- To understand the vocabulary and to learn to apply techniques of microprocessor programming, design, and application to solving real world problems.
- To understand the relationship between the various components of a microprocessor system, to learn about control signals flow and to understand how data is processed by a computer.
- To learn how to assemble, test and repair modern computer electronics circuits involving discrete and surface mount components.
- To understand the definition of a device and a device driver and how devices and device drivers are developed for modern computers.

OUTCOMES:
After completing this course, students are expected to have:
- Knowledge of microprocessor theory and architecture.
- Knowledge of electrical/computer engineering safety
- Ability to construct and analyze microprocessor circuits
- Ability to effectively use electrical/electronics measurement tools
- Ability to assemble modern computer circuitry involving discrete and surface mount components, apply troubleshooting techniques in the identification and correction of faults in a safe and proficient manner in microprocessor circuits
- Ability to conduct experiments, obtain data and make improvements in designs
- Ability to produce written documents
- Ability to design, program and troubleshoot computer programs
- Effective teamwork skills
- Commitment to quality, timeliness, and continuous improvement

MEETING PLACE AND TIME: Time: Place:

INSTRUCTOR: Name**:** Contact information: Office Hours:

METHOD OF EVALUATION:
The students will be evaluated on classroom and laboratory participation, homework, and tests. The student must meet minimum standards for laboratory work and assignments for satisfactory completion of the course. Grade will be determined as follows.

Assessments	5%
Homework	5%
Tests	30%
Labs	20%
Project Report	10%
Project Presentation	10%
Final Exam	20%

Course grade: 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = F

TOPICAL OUTLINE and SCHEDULE:

Wk	Date	Assignments/Evaluations
1		Mod 1 - Intel/PC Assembly Language Programming & Course Overview: Assessment 1 – Know the structured steps for writing assembly Language programs Lab 1 – Edit and assemble a simple program to run on the PC using MASM
2	Before Class	Worksheet 1 – Basic Assembly Language Programming Techniques Mod 2 - Intel Computer Architecture & Program Structure: Assessment 2 – Know the Elements of Computer System
		Unit test 1 Lab 2 – Build and Test the PC Parallel Port Interface Cable
3	Before Class	Worksheet 2 - Computer System Block & Bus Diagram Mod 3 - Computer Operating and Basic Input and Output System, (BIOS): Assessment 3 – Understanding the BIOS Commands
		Lab 3 – Modifying the Simple Text Editor Program
4	Before Class	Worksheet 3 – PC Assembly Language BIOS Structure Mod 4 - Components of an Intelligent PC Device and Device Driver: Assessment 4 – Peripheral device interface vocabulary
		Lab 4 – Design a PC interfaced event counter on your trainer
5	Before Class	Worksheet 4 – Write short peripheral device access programs Mod 5 - Using The TI 430 RISC Proc. & Dev. Tools to Design Devices: Assessment 5 – Questions about the TI 430 register organization and structure
		Unit Test 2 Lab 5 – Add the TI 430 Trainer DIP interface, assemble & run LED flasher
6	Before Class	Worksheet 5 – Using the TI eZ430-F2013 Module Mod 6 - The TI 430 Architecture and its RISC Instruction Set: Assessment 6 – General questions about the TI 430 I/O System
		Lab 6 - Design and build an eight bit counter using the eZ430 module
7	Before Class	Worksheet 6 – I2C SRAM, EEPROM, ADC & I/O TI 430 controller Mod 7 - TI 430 Controller Interface to PCs Using USB, P Port, I2C, PCI, & WYFI: Assessment 7 – Questions about USB, P Port, & I2C, ports and interface
		Lab 7&8 – Build & debug the OrchEd MSP430-F2274 Controller Module
8	Before Class	Worksheet 7 - MSP 430 serial data interface design problems
		Unit Test 3
		Spring break

9	Before Class	Mod 8 - Designing an Intelligent PC Peripherals Using the TI 430: Assessment 8 - List different methods of communicating with a PC
		Lab 8 - Send data to and from your TI 430 controller to a PC
10	Before Class	HW 8 - Design a TI 430 controller interface to a PC Mod 9 - Understanding & Designing Disk Data Storage Routines Assessment 9 - Using the DOS BIOS commands to store & retrieve data
		Project 1 – Start of group device project design – Project Specification
11	Before Class	Worksheet 9 – Design a file executive program Mod 10 - More on Applications of the OrchEd TI 430 Controller Module: Quiz 10 - Write a program to read a keypad & display the results
		Project 2 - Build the keypad and display device on your trainer
12	Before Class	HW 10 - Designing multiplexed or shared ports - keypad & display Mod 11 - Interfacing PCs and TI 430 Controllers to Ext. Machines Assessment 11 – Describe steppers, opto-isolators, triac controllers
		Unit test 4 Project 3 – Final Hardware and Software Designs
13	Before Class	Worksheet 11 – Designing machine controllers & stepper drivers Mod 12: Analog Signal Conversion, Data Processing, and System Control: Assessment 12 - Using the OrchEd Module ADC & advanced features
		Project 4 –Integrate and Test Hardware and Software Together
14	Before Class	Worksheet 12 – Designing data acquisition and control systems Mod 13 - Using Visual Basic & Assembly Language to Design PC GUIs: Graphic Interfaces Quiz 13 - Create a custom mouse cursor using the mouse BIOS
		Project 5 - Finish debugging your group project
15	Before Class	Worksheet 13 - VB 6 GUI interface design of parallel port interface monitor Prepare final project report
		Project Presentations, Final Project report due, Instructor/Course Evaluation
16		**Final Exam**

MIAMI UNIVERSITY LEARNING COMMUNITY:
Miami University is committed to fostering a supportive learning environment for all students irrespective individual differences in gender, race, national origin, religion, handicapping condition. sexual preference, or age. Students should expect, and help create, a learning environment free from all forms of prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences is behaviors that undermine our learning community. If such behaviors occur in class, please seek the assistance of your instructor or department chair.

NOTES:
1. The instructor may make changes as deemed necessary.
2. The order may be changed depending upon students'/instructor's needs.
3. Homework assignments and laboratory reports are due at the beginning of the next class meeting.
4. Late submissions of assignments will result in a reduced grade.
5. Assignments are due one week after being assigned. Assessments, worksheets and labs submitted after the unit test after they are due will only receive half credit.
6. This class is being offered in Hybrid form. Some of the class will be online and some will be on-campus. You should view recorded lectures downloaded from Blackboard and do the Assessment before coming to class as indicated in the Topical Outline and Schedule. Tests and labs will be done on-campus as indicated in the Topical Outline and Schedule.