

STATE UNIVERSITY OF NEW YORK  
COLLEGE OF TECHNOLOGY  
CANTON, NEW YORK



MASTER SYLLABUS

**ELEC 213 - MICROPROCESSORS**

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY  
ELECTRICAL ENGINEERING TECHNOLOGY & ENGINEERING SCIENCE  
DEPARTMENT  
FALL 2018

## **ELEC 213 - MICROPROCESSORS**

A. **TITLE:** Microprocessors

B. **COURSE NUMBER:** ELEC 213

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

# Credit Hours: 3 %

# Lecture Hours: 2 per week \$

# Lab Hours: 3 per week \$

Other: per week

Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE:** No

E. **GER CATEGORY:** NONE

F. **SEMESTER(S) OFFERED:** Fall and Spring

G. **COURSE DESCRIPTION:**

The 8085 8-bit instruction set and the internal hardware register are studied. The basic operation of Fetch and Execute operations are examined. The PIC micro family microcontrollers will be introduced to provide the student with hardware and software experience in working with these devices. The student will use a cross-assembler to generate the software programs to be written for the microcontrollers. The RS-232C Serial data transmission interface is also studied.

H. **PRE-REQUISITES:** Digital Fundamentals & Systems and Laboratory (ELEC 165/166) or permission of the instructor.

**CO-REQUISITES:** NONE

I. **STUDENT LEARNING OUTCOMES:**

**Institutional Student Learning Outcome (ISLO's)**

- (1) Communication Skills
- (2) Critical Thinking
- (3) Foundational Skills
- (4) Social Responsibility
- (5) Industry, Professional, Discipline-Specific Knowledge and Skills.

**Accreditation Board for Engineering and Technology ABET- Student Outcomes (a-k)**

<b>Course Objectives</b>	<b>ABET- Student Outcomes (a-k)</b>	<b>ISLO's</b>
<b>1. Develop a flow chart and a machine language program to copy the contents of one byte of memory to another location in that same memory.</b>	(a) An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	(2) Critical Thinking  (5) Industry, Professional, Discipline-Specific Knowledge and Skills.
<b>2. Develop a flow chart and an assembly language program to simulate the logical operation between two input signals and display the logical result on an LED connected to an output port.</b>	(a) An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;	(2) Critical Thinking  (5) Industry, Professional, Discipline-Specific Knowledge and Skills.
<b>3. Determine the stack contents after the execution of a main program that contains two nested subroutines.</b>	(a) An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities.	(2) Critical Thinking  (5) Industry, Professional, Discipline-Specific Knowledge and Skills.

**J. APPLIED LEARNING COMPONENT: CLASSROOM/LAB**

**K. TEXTBOOK: \$Benson, David. (2005) *Easy Microcontrol'n. 4.1th Ed.* Hayden , ID: Square 1 Electronics**

**L. REFERENCES: None**

**M. EQUIPMENT:** PIC Microcontroller programmers

**N. GRADING METHOD:** A - F

**O. SUGGESTED MEASUREMENT CRITERIA/METHODS:**

- Hourly exams,
- Quizzes
- Homework assignments
- Written laboratory reports

**P. DETAILED COURSE OUTLINE:**

- I. Introduction to RS-232C Serial Data Transmission Protocol
- II. % Eight-bit Microprocessor Operation (8085)
  - A. Hardware configuration
  - B. Fetch and Execute Machine Cycles
  - C. Complete operation for MOV IMM Instruction
  - D. Stack operations using PUSH and POP Instructions
- III. % Introduction to Flow Charting
- IV. % Introduction to the PIC (Peripheral Interface Controller) 8-bit Microcontroller
- V. % Use of the Cross assembler for the PIC devices
- VI. % Development of Input/Output programs for the PIC
- VII. % Development of Logic and Arithmetic operations for the PIC
  - A. Logical operations (AND, OR, Ex OR and Complement)
  - B. Rotate instructions
  - C. Arithmetic Operations (Add and Subtract)
- VIII. Development of Decision making operations for the PIC
  - A. Branching and Jumps
  - B. Use of subtract for Compare operations

## IX. Development of Programming for Loops, Counters, Time Delays, and subroutines

### Q. LABORATORY OUTLINE

#### ELEC 213 - MICROPROCESSORS

1	Introduction to the RS 232C Interface
LP-1	Lab Practical for the RS232C Interface
2	Introduction to the PIC Assembler and Flash Programmer
3*	Input/Output Programs for the PIC using Data Directional Registers
4*	Introduction to the PIC Assembler and the Counter Programs
5*	Introduction to the PIC Assembler and the Delay Programs
6*	Introduction to the PIC Assembler and the Logic Simulator Program
7*	Introduction to the PIC Assembler and the Response Time Program
LP-2	Lab Practical for the PIC

\*Two-week experiments