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

MASTER SYLLABUS

ELEC 213 - MICROPROCESSORS

CIP Code: 15.0303

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
ELECTRICAL ENGINEERING TECHNOLOGY & ENGINEERING SCIENCE DEPARTMENT
FALL 2025

A. TITLE: Microprocessors

B. COURSE NUMBER: ELEC 213

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

Number of Credit Hours per Week	3
Number of Lecture Hours per Week	2
Number of Lab Hours per Week	2
Other per Week	0

D. WRITING INTENSIVE COURSE:

Yes	
No	No

E. GER CATEGORY: NONE

Does course satisfy a GER category or categories? If so, please select all that apply.

[1-2] Communication	
[3] Diversity: Equity, Inclusion & Social Justice	
[4] Mathematics & Quantitative Reasoning	
[5] Natural Science & Scientific Reasoning	
[6] Humanities	
[7] Social Sciences	
[8] Arts	
[9] US History & Civic Engagement	
[10] World History & Global Awareness	
[11] World Languages	

F. SEMESTER(S) OFFERED:

Fall	
Spring	YES
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:

a. Pre-requisite(s): Digital Fundamentals & Systems and Laboratory (ELEC 165/166) or permission of the instructor.

b. Co-requisite(s): None

I. STUDENT LEARNING OUTCOMES:

Course Student Learning Outcomes	ABET- Student Outcomes (1-5) / PSLO	Institutional Student Learning Outcomes ISLO/Subsets	GER
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.	(1) An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to discipline;	(2) Critical Thinking (5) Industry, Professional, Discipline-Specific Knowledge and Skills.	None
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.	(1) An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to discipline;	(2) Critical Thinking (5) Industry, Professional, Discipline-Specific Knowledge and Skills.	
3. Determine the stack contents after the execution of a main program that contains two nested subroutines.	(1) An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to discipline;	(2) Critical Thinking (5) Industry, Professional, Discipline-Specific Knowledge and Skills.	

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

J. APPLIED LEARNING COMPONENT:

Yes	Yes
No	

If yes, select one or more of the following categories:

Practicum (Non-Clinical Placement)	X	Community Service	
Internship		Civic Engagement	
Clinical Practicum		Creative Works/Senior Project	
Practicum		Research	
Service Learning		Entrepreneurship [program, class, project]	

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 Micro-controller

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**

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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-weeks / experiment