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

MASTER SYLLABUS

ELEC 166 - Digital Fundamentals & Systems Laboratory

CIP Code:15.03.03

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

A. **TITLE:** Digital Fundamentals & Systems Laboratory

B. **COURSE NUMBER:** ELEC 166

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

Number of Credit Hours per Week	1
Number of Lecture Hours per Week	0
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 OFFERED: Spring**

G. **COURSE DESCRIPTION:** A digital laboratory course with emphasis on topics such as: Adder/ Subtraction Circuit, Code Converters, Multiplexers and De-multiplexers, JK

Flip-Flop Circuits, Counters, Shift Registers, Timers, Memories Devices, Analog to Digital and Digital to Analog Converts and Digital Circuit Troubleshooting.

H. **PRE-REQUISITES:**

a. Pre-requisite(s): Electric Circuits I and Laboratory (ELEC 101/109), or permission of instructor.

b. Co-requisite(s): None

I. STUDENT LEARNING OUTCOMES

Course Student Learning Outcomes (SLO)	**ABET-Student Outcomes (1-5) / Program Student Learning Outcome (PSLO)**	**GER**	**ISLO's & Subsets**
1. Construct and Evaluate Logic Circuits Using Tri-State Buffers and Inverters Circuits 2. Design, Construct and Evaluate a Digital Electronic Switch Circuit. 3. Design, Construct and Evaluate a Three Bit Decoder Circuit for a Seven Segment LED Readout.	(4) An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;	None	(2) Critical Thinking (5) Industry, Professional, Discipline-Specific Knowledge and Skills.
4. Construct and evaluate a two-decade BCD Counter Circuit Using Seven-Segment LED Readouts. 5. Construct and evaluate a 2048 Byte, 8 Bit Memory System.	(4) An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;		(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. TEXTS:

1) Tokheim, Roger L. *Digital Electronics: Principles & Applications*. 9^{th}/*e*. New York: McGraw-Hill, 2021

REFERENCES: NONE

L. EQUIPMENT: Students are required to purchase laboratory components.

M. GRADING METHOD: A-F

N. SUGGESTED MEASUREMENT CRITERIA/METHODS

- Completion of Laboratory Experiments
- Laboratory Practicum.
- Laboratory Reports

P. DETAILED COURSE OUTLINE: NONE

Q. LABORATORY OUTLINE:

1 CHARACTERISTICS OF LOGIC GATES

2 CONSTRUCTION OF an INPUT PORT (Logic Switches) and An OUTPUT PORT (LIGHT EMITTING DIODES – LEDS)

3 CONSTRUCTIONS OF a 1Hz and 10 Hz CLOCK SOURCE

4 TWO BIT DECODER CIRCUITS

5 DIGITAL ELECTRONIC SWITCHES

6 TRI-STATE GATES APPLICATIONS

7 CHARACTERISTICS OF SEVEN SEGMENT READOUTS and the DESIGN OF A THREE BIT DECODER for SEVEN SEGMENT READOUTS with a HEADS-UP DISPLAY OPTION

8 OPERATING CHARACTERISTICS and APPLICATIONS of the 74LS47 DECODER

9 CONSTRUCTION OF A TWO DECADE EVENT COUNTER USING SEVEN SEGMENT READOUTS

10 ON-SCREEN CHARACTER GENERATOR --Part 1, Construction of an Eight Bit Input/Output Tri-State Data Bus and the Design of an 1ms Pulser

11 ON-SCREEN CHARACTER GENERATOR --Part 2, Addition of an Eight Bit Memory System to the Eight Bit Input/Output Tri-State Data Bus

12 ON-SCREEN CHARACTER GENERATOR --Part 3, Addition of Digital to Analog Converters to Exp. # 11 (Two Weeks)