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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
ELEC 172 - ELECTRICAL CONSTRUCTION & MAINTENANCE II
(Certificate Program)

Created by: Michael Spearance

Updated by: November 20, 2018

Canino School of Engineering Technology

Department: ENVIRONMENTAL, CIVIL AND CONSTRUCTION TECHNOLOGY

Semester/Year: SPRING 2019

A. **TITLE**: Electrical Maintenance & Construction II

B. **COURSE NUMBER:** ELEC 172

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

 # Credit Hours: 7
 # Lecture Hours: 3 **per week**
 # Lab Hours: 8 **per week**
Other: **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☒ **Yes:** GER
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☐ **Spring** ☒ **Fall & Spring** ☐

G. **COURSE DESCRIPTION:**

Continuation of Electrical Construction and Maintenance I. Includes additional instruction in basic AC system theory, three phase circuits, motors - motor control, transformer theory - connections. Laboratory projects include diagnosis of electrical equipment, motors - motor starters, transformer connections and raceway installations for Commercial Electrical applications. Certificate/ AAS Elective Credit

H. **PRE-REQUISITES: None** ☐ **Yes** ☒ **If yes, list below:**

ELEC 171, ELEC 173

CO-REQUISITES: None ☐ **Yes** ☒ **If yes, list below:**

MATH 101 or MATH 106, SOET 101

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
a. Explain current flow for a given circuit			2-Crit Think 3-Found Skills ISLO	Subsets Subsets Subsets Subsets
b. Design and analyze motor circuit sizing			2-Crit Think 3-Found Skills ISLO	Subsets Subsets Subsets Subsets
c. Design and analyze transformer circuits			1-Comm Skills 3-Found Skills ISLO	Subsets Subsets Subsets Subsets
d. Design and analyze multi-phase circuits			2-Crit Think 3-Found Skills ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

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**

*Include program objectives if applicable. Please consult with Program Coordinator

J. APPLIED LEARNING COMPONENT: Yes ☒ No ☐

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

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. TEXTS:

Hermon, Stephen. Delmar's Standard Textbook of Electricity 6th Edition. Clifton Park: Cengage.

L. REFERENCES:

2017 National Electric Code Book

M. EQUIPMENT: None ☐ **Needed:** supplied by college motors, transformers, conduit benders, motor starters and electrical conductors

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Exams**
- **Quizzes**
- **Papers**
- **Attendance**

P. DETAILED COURSE OUTLINE:

I. Alternating Current Principles
A. A-C Power
1) Three Phase
2) Single Phase

II. Polyphase Circuits
A. Introduction to Delta Connections
1) How coils are connected in Delta
2) Meaning of the term Delta
B. Current relationships in a Delta Connection
C. KVA Capacity of a Delta Connection
D. Closed Delta Transformer Bank

1) Connection of primary & secondary windings
E. Single Phase Transformers Connected in WYE
1) How coils are connected in wye
2) Meaning of term wye
F. Wye-Wye Connected Transformer Banks
G. Delta-Wye Connected Transformer Banks

III. Transformers
A. Applications of Transformers
B. Construction Of Transformers
C. Elementary Principles of Transformers
D. Polarity
E. Single Phase Connections
F. Transformer Cooling

IV. Single Phase Motors
A. Construction of Split Phase Motor
B. Principles of Operation of Split Phase Motor
C. Principles of Operation of Capacitor Start Motor

V. Three Phase Motors
A. Construction of Motor
B. Principle of Operation
C. Rotor Field
D. Stator Windings
E. Starting Current
F. Reversing Rotation

VI. A-C Motor Controls
A. Starting Squirrel Cage Motors
B. Across the Line Magnetic Motor Starters
C. Motor Reversing

VII. System and Equipment Grounding
A. Grounding Defined
B. Definition of Voltage to Ground
C. Identification of Grounded Conductors
D. Methods of Equipment Grounding

VIII. Conductors and Raceways
A. Conductor insulation
B. Effects of Heat on Conductors
C. Conductor Material
D. Overcurrent Protection
E. Fuses and Circuit Breakers
F. Voltage Drop Calculations
G. Function of Raceways
H. Types of Raceways

VIIII. Lighting
A. Incandescent
B. LED

C. Vapor Lamp
D. Fluorescent Lamp
E. Illumination

IX. Commercial Electrical System
A. Generating Station to Substation
B. Distribution of Power
C. Service Entrance Equipment
D. Feeders and Sub feeders
E. Branch Circuits

Q. <u>LABORATORY OUTLINE</u>: None ☐ Yes ☒

1) Drill, Tap and Caliper Measurements
2) Metal Clad Cable #1
3) Metal Clad Cable #2
4) Metal Clad Cable #3
5) Electric Water Heater
6) 120 Volt Relay Circuit
7) Water Tower Control Circuit
8) Single Phase Transformers Step Up- Step Down
9) Single Phase Transformer Three Wire Secondary
10) EMT Raceway cutting, Reaming
11) EMT Raceway Bending #1
12) EMT Raceway Bending #2
13) EMT Raceway Bending #3
14) Three Phase Transformers Delta to Wye

15) Three Phase Transformers Wye to Delta
16) Three Phase Transformers Wye to Wye
17) Three Phase Transformers Delta to Delta
18) Three Phase Motor Testing
19) Three Phase Load Testing
20) Photo Eye Control 120 Volt Load
21) Photo Eye Control 208 Volt Load
22) 120 Volt Holding Circuit
23) Motor Starter Two Wire Control
24) Motor Starter Three Wire Control