

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



**MASTER SYLLABUS**

ECMR 102 – Electricity for Trades II

**CIP Code: 46.0399**

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Updated by: Christopher Mayville**

**Canino School of Engineering Technology  
Mechanical  
Spring 2024**

A. TITLE: Electricity for Trades II

B. COURSE NUMBER: ECMR 102

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

# Credit Hours: 3

# Lecture Hours: 3 per Week

# Lab Hours: \_\_\_\_\_ per Week

Other \_\_\_\_ per Week

Course Length (# of Weeks): 15 weeks

D. WRITING INTENSIVE COURSE: No

E. GER CATEGORY:

Does the course satisfy more than one GER category? If so, which one? No

F. SEMESTER(S) OFFERED: (Fall, Spring, or Fall and Spring) Spring

G. COURSE DESCRIPTION: Continuation of Electricity for Trades I. Includes additional instruction in basic AC system theory, three-phase circuits, motors - motor control, and transformer theory - connections. Laboratory projects include diagnosing electrical equipment, motors - motor starters, transformer connections, and raceway installations for Commercial Electrical applications.

H. PRE-REQUISITES: Yes - ECMR 101

CO-REQUISITES: Yes - Math 101 or Math 106

I. STUDENT LEARNING OUTCOMES: By the end of the course, the student will be able to:

<u>Course Student Learning Outcome [SLO]</u>	<u>PSLO</u>	<u>GER</u>	<u>ISLO</u>
a. Explain the current flow for a given circuit	1. Install wiring systems...		5. Industry, Professional, Discipline Specific Knowledge and Skills
b. Troubleshooting and analyzing motor circuit sizing	3. Perform Routine Maintenance on motors and transformers		5. Industry, Professional, Discipline Specific Knowledge and Skills
c. Troubleshooting and analyzing transformer circuits	1. Install wiring systems...		5. Industry, Professional,

			<b>Discipline Specific Knowledge and Skills</b>
d. Troubleshooting and analyzing multi-phase circuits	1. Install wiring systems...		<b>5. Industry, Professional, Discipline Specific Knowledge and Skills</b>

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

J. APPLIED LEARNING COMPONENT: Yes **X** No \_\_\_\_\_

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

Classroom/Lab **X**  
 Internship \_\_\_\_\_  
 Clinical Practicum \_\_\_\_\_  
 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 6<sup>th</sup> Edition.  
Clifton Park: Cengage.
- L. REFERENCES: National Electric Code Book 2017
- M. EQUIPMENT: 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**
- VIII. 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. LABORATORY OUTLINE: None**