

Course Information Form (CIF)

Course Code: ELX 119

Course Title: Industrial Electrical Work, NEC Review, Contracting, and Estimating

Department: Applied Sciences and Technologies

Effective Date: Summer 2026

PCS Code: 1.2 - Occupational/Technical Instruction

CIP Code: 46.0302

Repeatability: 0

Credit Hours

Catalog Notation: 1-2-2

Credit Hour Distribution:

Lecture: 1

Lab: 2

Clinical: 0

Total: 2

General Course Information

Catalog Description

Comprehensive review of electrical considerations unique to commercial and industrial applications; three-phase equipment and machine control devices including programmable logic controllers and instrumentation common to manufacturing. Introduction to the business side of electrical contracting and estimating; comprehensive National Electrical Code review.

General Course Objectives

The student should be able to describe industrial processes and the equipment commonly used in manufacturing. They should also be able to perform electrical tasks specific to industrial electrical work, such as the operation and maintenance of programmable logic controllers and other controls common to automation. The student should also be able to describe the process of electrical contracting and estimating and the resources available to streamline the process. The student should also be able to demonstrate a firm understanding of the layout of the NEC codebook and how to use it as a primary resource for electrical installations.

Minimum Placement Levels

English

None

Reading

None

Math

Placement out of MAT 060

Prerequisites

Credit in ELX 118

Methods of Evaluation

Students will be given a minimum of 2 quizzes, 2 labs, 1 final exam, and 1 lab practical exam.

Instructional Materials and Additional Supplies

Electrical Wiring Residential, 21st Edition. Millin, Simmons & Vigstol. Cengage Publishing. 978-0357766965

Illustrated Guide to the National Electrical Code, 9th Edition. Charles R. Miller. Cengage Publishing. 978-0357766712

National Electrical Code 2020, 978-1455900008

Safety glasses

Course Content

General Learning Outcomes (GLOs)

- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Industrial Electrical Processes	- Describe the common voltages and power demands of a large industrial process. - Define selected industrial signal types and controls and describe their operation. - Describe and identify various power distribution components found in large commercial and industrial facilities such as substations, switchgears, transformers, power distribution buses and panels, motor control centers, and lighting panels and their associated circuits. - Identify and describe safety considerations specific to higher voltages such as arc flash, arc blast, and ground faults. - Demonstrate the ability to connect and write code into SLC 500 and CompactLogix 5000 programmable logic controllers and HMI panels to control an automated process. - Demonstrate understanding of the construction and operation of industrial AC and DC motors, and how they are connected to variable frequency drives, solid state starters, and DC drives for starting and speed control. - Demonstrate the ability to connect and program motion control devices to DC, induction, and Servo systems.	9	12	0
Illustrated Guide to the National Electric Code, Section One	- Describe in detail the purpose and scope of the NEC (article 90). - Define selected terms from chapter one, Definitions (article 100). - Demonstrate the ability to identify various boxes and enclosures and use the appropriate NEC tables to determine box fill (article 314). - Demonstrate understanding of physical characteristics, ampacity, and support requirements for different types of cable as defined in the NEC (articles 320-338). - Describe and identify various types of conductors and conduit and demonstrate the ability to determine installation and fill requirements as detailed in the NEC (articles 344-400).	1	3	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Illustrated Guide to the National Electric Code, Section Two	1. Demonstrate the ability to calculate the minimum number and types of circuits in a given single-family dwelling, and the associated devices and current requirements. 2. Describe the differences in location types in context with electrical devices and enclosures, and how these environments factor into their selection (articles 110-300). 3. Describe specific provisions (e.g., small-appliance circuits) and how they are identified and installed (article 210). 4. Demonstrate the ability to perform demand factor calculations in order to determine the size and ampacity of service entrance conductors and equipment (article 220).	1	3	0
Illustrated Guide to the National Electric Code, Section Three	1. Explain how general services, disconnects, and receptacle and lighting calculations and installations are taken into account when considering requirements for multifamily dwellings (articles 200-310). 2. Demonstrate the ability to perform load calculations for multifamily dwellings (articles 200-310).	1	3	0
Illustrated Guide to the National Electric Code, Section Four	1. Describe general lighting and branch circuit provisions for commercial locations and how these contrast with residential requirements (articles 200-600). 2. Define structures classified as nondwelling and demonstrate how to calculate load requirements for them (Articles 200-600). 3. Describe how services, feeders, and equipment are selected and sized for commercial locations (articles 200-600).	1	3	0
Illustrated Guide to the National Electric Code, Section Five	1. Describe hazardous locations in terms of class and division, define classes 1-3, and describe divisions within them (article 500). 2. Define some special installation requirements for given hazardous locations (article 500). 3. Describe some special considerations and wiring requirements for health care facilities (article 517). 4. Demonstrate the ability to determine special requirements for industrial applications and demonstrate the ability to calculate three-phase loads. 5. Demonstrate the ability to connect and test common three-phase devices (article 430).	1	3	0
Electrical Contracting and Estimating	1. Describe in the most basic terms the process of starting and operating an electrical business and the advantages, challenges, and responsibilities a self-employed electrical contractor might need to consider. 2. Define the legal requirements needed to perform electrical work in the applicable area of jurisdiction, and the protective terms and measures electricians need to consider regarding liability. 3. Describe the estimating process and the tools commonly used by electrical estimators. 4. Demonstrate the ability to perform a complete materials list and labor estimation for a given electrical project.	1	3	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
15	30	0