Electrical Installation and Maintenance Technology (EIMT)

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EIMT 99V : Special Studies

Description: See explanation under the heading of Special Studies.

EIMT 121 : Electrical Fundamentals

Credits: 3
Class Hours: 3 lecture
Description: This course introduces students to AC and DC electrical theory and practical concepts, including basic laws and formulas. This course includes how basic circuits are configured and the necessary materials required and the wiring of common electrical devices. Tools and test equipment requirements and simple wiring techniques will be covered.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Explain the difference between AC and DC principles.
2. Calculate the voltage, resistance, and current for series, parallel, and series-parallel circuits.
3. Exhibit the safe work practices involved with working on testing electrical circuits.
4. Demonstrate the proper use and selection of electrical test equipment on a circuit.
5. Show the proper selection and use of the materials required for the circuits that they create.
6. Demonstrate the proper use of the tools required to assemble the projects in the lab.
7. Explain the rules (National Electrical Code) that are involved in the assignments of both classroom and lab.
8. Demonstrate the identification of electrical components of an electrical circuit, and the function of each one.

EIMT 123 : Wiring Materials, Methods, and NEC Codes

Credits: 3
Class Hours: 2 lecture and 2 lecture/lab
Description: This course is an introduction to the National Electrical Code (NEC) requirements for branch circuit wiring. The selection and installation of materials and the methods used following NEC guidelines for common electrical circuits within the home are covered. Selection, sizing, and electrical safety requirements are explained as well as basic troubleshooting skills.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Identify common electrical devices and determine their use.
2. Select the proper size wire, raceway, and box for a given circuit.
3. Exhibit safe work practices involved with working in a construction environment.
4. Interpret the grounding and bonding requirements with the proper ground-fault and arc-fault protection in the application of a single family dwelling.
5. Demonstrate the proper use of tools required to install materials in the required manner.
6. Explain the (National Electrical Code) rules related to the selection and installation of different materials.
7. Demonstrate the selection of the necessary electrical components based on the size of the circuit required and the equipment rating.
8. Demonstrate basic troubleshooting skills for common circuits.
9. Identify various career paths available in the electrical trade.
10. Define green technology and the employment opportunities for electricians.

EIMT 131 : Residential Installation Theory

Credits: 4
Class Hours: 4 lecture
Prerequisites: "C" or higher or concurrent enrollment in in EIMT 135.
Recommended: "C" or higher in EIMT 121 or EIMT 123.
Description: This course is designed to develop knowledge of basic and advanced residential wiring with emphasis on the National Electrical Code, energy efficiency, and the principles of residential blueprint reading.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Determine the service, feeder, overcurrent protection and the branch circuits in a dwelling unit.
2. Design the electrical system for a typical residence, including load calculations.
3. Apply the ability to read and comprehend electrical blueprints.
4. Interpret the electrical system rough-in of wire, boxes, and raceways according to the (National Electrical Code) requirements.
5. Identify the proper materials to provide an energy efficient electrical system that meets the required codes.
6. Demonstrate knowledge and application of technical math.
7. Evaluate the maintenance and troubleshooting problem and show skills required to ensure satisfied customers.
8. Define Green House techniques to create the most up-to-date and efficient sustainable home possible.
9. Explain the trim-out of switches, device receptacles, and luminaries throughout a house.

EIMT 135 : Residential Installation Lab

Credits: 6
Class Hours: 12 lecture/lab
Prerequisites: "C" or higher or concurrent enrollment in EIMT 131.
Recommended: "C" or higher in EIMT 121 or EIMT 123.
Description: This course is designed to provide the basic and advanced knowledge in residential wiring techniques. Laboratory exercises are designed to give students practical experience in different wiring techniques and methods.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Perform maintenance, troubleshoot problems, and demonstrate skills required to ensure satisfied customers.
2. Design the electrical system for a typical residence, including load calculations.
3. Construct the trim-out of switches, device receptacles, and luminaries throughout a house.
4. Demonstrate the electrical system rough-in of wire, boxes, and raceways according to the (National Electrical Code) requirements.
5. Select the proper materials to provide an energy efficient electrical system that meets the required codes.
6. Demonstrate knowledge and application of technical math in residential calculations.
7. Apply the ability to read and comprehend residential electrical blueprints.
8. Identify the service, feeder, and overcurrent protection and the branch circuits in a dwelling unit.
9. Select greenhouse techniques to create the most up-to-date and efficient sustainable home possible.

EIMT 145 : Commercial Installation Theory

Credits: 4
Class Hours: 4 lecture
Prerequisites: "C" or higher or concurrent enrollment in EIMT 147.
Recommended: "C" or higher in EIMT 121 or EIMT 123.
Description: This course is designed to develop knowledge of commercial and industrial wiring techniques with emphasis on the National Electrical Code, energy efficiency, and the principles of advanced electrical blueprint reading.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Interpret the National Electrical Code in general requirements, wiring and protection, wiring methods and materials, and equipment for general use.
2. Apply the ability to read and comprehend commercial and industrial electrical blueprints.

3. Evaluate special conditions such as special locations installations, transformers, overcurrent devices, and distribution equipment.
4. Identify the proper materials to provide an energy efficient electrical system that meets the required codes.
5. Interpret the electrical system rough-in of wire, boxes, and raceways according to the National Electrical Code requirements used in commercial installations.
6. Demonstrate knowledge and application of technical math in commercial applications.
7. Design the electrical system for a commercial building, including load calculations.
8. Summarize the grounding and bonding of electrical systems according to the National Electrical Code.

EIMT 147 : Commercial Installation Lab

Credits: 6
Class Hours: 12 lecture/lab
Prerequisites: "C" or higher or concurrent enrollment in EIMT 145.
Recommended: "C" or higher in EIMT 121 or EIMT 123.
Description: This course is designed to advance the knowledge of commercial and industrial wiring techniques with emphasis on the National Electrical Code, energy efficiency, and the principles of advanced electrical blueprint reading.
Semester Offered: Fall, Spring
Course Student Learning Outcomes (CSLOs):

1. Make use of the electrical system rough-in of wire, boxes, and raceways according to the National Electrical Code requirements used in commercial installations.
2. Utilize the National Electrical Code in general requirements, wiring and protection, wiring methods and materials, and equipment for general use.
3. Select the proper materials,to provide an energy efficient electrical system that meets the required codes.
4. Apply the ability to read and comprehend electrical blueprints.
5. Demonstrate knowledge and application of technical math in commercial applications.
6. Determine the grounding and bonding of electrical systems according the National Electrical Code.
7. Design the electrical system for a commercial building, including load calculations.
8. Identify special conditions such as special locations installations, transformers, overcurrent devices, and distribution equipment.

EIMT 151 : Industrial Motor Controls

Credits: 3
Class Hours: 2 lecture and 2 lecture/lab
Prerequisites: "C" or higher in EIMT 123.
Recommended: "C" or higher in EIMT 121.
Description: This is an introduction to motor controls and the logic sequence that they implement. The course covers how to read a ladder diagram, including component recognition, use, and application. Students will develop skills to create a computer generated control diagram from a sequence of operations and learn troubleshooting skills to diagnose basic control functions.
Semester Offered: Spring
Course Student Learning Outcomes (CSLOs):

1. Interpret the proper use of the symbols used to express electrical control devices.
2. Demonstrate the wiring a motor starter with standard industry three- wire controls while following a line diagram.
3. Preform a wiring diagram to form a sequence of operation statement.
4. Demonstrate the wiring of a start-stop-jog control scheme.
5. Construct a program with a programmable logic controller to create a given automated circuit.
6. Simulate a troubleshoot procedure to a basic control circuit under various fault conditions.
7. Design a ladder diagram with the use of control devices, signals, decisions, and actions.
8. Explain the difference between a wiring diagram and a ladder diagram.
9. Demonstrate the wiring of a reversing motor circuit with interlock.
10. Develop an understanding of manual, mechanical, and automatic control devices.
11. Demonstrate the use of wiring logic functions in a control sequence.

12. Perform the wiring of a set of controls by reading a ladder diagram.

EIMT 153 : AC/DC Systems and Equipment

Credits: 6
Class Hours: 12 lecture/lab
Prerequisites: "C" or higher or concurrent enrollment in EIMT 121. "C" or higher in EIMT 123.
Recommended: "C" or higher or concurrent enrollment in EIMT 151.
Description: This course is designed to advance the student into electrical principles of direct current and alternating current equipment. Emphasis is placed on the theory, operation, control, and power generation of alternative energy systems including photovoltaic, wind, and hydro systems.
Semester Offered: Fall, Spring (once every 3 semesters)
Course Student Learning Outcomes (CSLOs):

1. Recognize the electrical characteristics of a DC, AC single- and three-phase electrical systems, including operating voltages, power, and capacity.
2. Identify transformer characteristics and provide proper materials, to provide an energy efficient electrical installation that meets the required codes.
3. Use a variety of renewable energy systems in a NIDA lab setting.
4. Apply the use of DC, AC single-phase and three-phase motors and their applications and troubleshooting.
5. Operate variable speed drives and softstarts using educational electrical software.
6. Apply electrical equipment to other energy systems such as fluid power.
7. Evaluate PLC's software, DeviceNet wiring, and LabView Software for application in advanced electrical use.

EIMT 170 : Renewable Energy PV

Credits: 3
Class Hours: 2 lecture and 2 lecture/lab
Recommended: Concurrent enrollment in EIMT 121 or EIMT 123.
Description: This course is designed to prepare the individual for entry into the photovoltaic field. Emphasis is on photovoltaic technology application, incorporating the electrical principles, solar radiation, load analysis, components of a system, maintenance, and types of systems. Successful completion of the course qualifies an individual to take the North American Board of Certified Energy Practitioners (NABCEP) Basic Entry Level exam.
Semester Offered: Fall
Course Student Learning Outcomes (CSLOs):

1. Identify the proper location and orientation of a grid-direct PV system for a given location.
2. Apply advanced PV system design (grid-direct) to install a system according to NEC requirements.
3. Design a grid-direct system using Solmetric Software and KIUC requirements.
4. Select the proper components of a system to meet the performance requirements of a Grid-Direct PV system defined specification.
5. Demonstrate the procedures for maintaining an existing PV system.
6. Identify common errors and safety issues when commissioning multiple-string systems.
7. Perform a load analysis on an existing dwelling.

EIMT 175 : Advanced Renewable Energy PV

Credits: 3
Class Hours: 2 lecture and 2 lecture/lab
Prerequisites: "C" or higher in EIMT 170.
Description: This course is designed to advance the student in the photovoltaic field using battery technology and stand-alone systems. Emphasis is on the application of photovoltaic systems following the National Electrical Code rules. System sizing, conductor sizing, grounding, and overcurrent protection are covered. Successful completion of the course satisfies the educational requirements for an individual to take the North American Board of Certified Energy Practitioners (NABCEP) Certification exam.
Semester Offered: Spring
Course Student Learning Outcomes (CSLOs):

1. Demonstrate the use of all types of batteries for selection, maintenance, and proper hook-up to a PV battery system appropriate for the grid.
2. Describe the configuration of various types of PV systems: PV direct, Stand-alone, PV/hybrid, Multimode, Zero-sell, Micro-grid, and Utility-scale energy storage.
3. Demonstrate the ability to select code compliant materials for a PV System fundamental (battery-based).
4. Identify and select the proper grounding and bonding equipment required for a PV system.
5. Design a stand-alone PV advanced system to be used in the calculations for PV array and sizing with MPPT and Non-MPPT charge controllers.
6. Demonstrate the procedures for commissioning and troubleshooting an Stand-alone PV system.