Northwest State Community College  
Course Information Sheet

# Course Information

Title: Industrial Electricity 1C

Course Number: PLC 122

Credit Hours: 1

Pre-requisite: PLC 121

# Description

This is an introductory course on the study of basic electrical concepts and circuits. The course will be based on Direct Current (DC) and Alternating Current (AC) concepts, terminology, components, and basic series/parallel circuits. Students will learn how to calculate and measure voltage, current, and resistance in basic series and parallel circuits. Students will learn how to utilize a Digital Multi-meter (DMM) to troubleshoot components in an electrical circuit, and test stand-alone components. The students will be introduced to DC and AC relay circuits, as well as electrical symbols that will be used on electrical prints. The course will have a heavy focus on troubleshooting concepts and techniques when working with electrical circuits.

# Learning Outcomes

Upon completion of this course the students will be able to:

1. Troubleshoot basic electrical components and circuits
2. Apply DC types of motors
3. Interpret basic electrical symbols and prints
4. Construct a basic electrical control circuit

# Required Material

**Text:**

DC Circuit Fundamentals Author: Lab-Volt; - ISBN: 978555000084

AC Circuit Fundamentals Author: Lab-Volt; ISBN: 978000088

**Supplies:**

Calculator

Safety Eyewear

DMM

Wire Strippers

Wiring Kit

# Industrial Electricity 1C Module 1: Troubleshooting Electrical Circuits

This module will focus on troubleshooting basic electrical circuits with various types of switches and loads.  A heavy focus will be analyzing circuits to determine what voltage should be measured at various points in an electrical circuit, and how to correlate this to an electrical print.

Upon completion of this module the student will be able to:

1. Wire an electrical circuit with switches and loads, from an electrical diagram
2. Wire and test a circuit with a selector switch and a SPDT switch with 3 loads
3. Wire and test a circuit with a relay and a N.O. & N.C. contacts controlling loads
4. Wire and test a circuit controlling the direction and speed of a DC motor
5. Explain how a DMM would be connecting in a circuit to measure voltage & current
6. Explain what a DMM would read when testing components out of circuit
7. Predict the voltage that should be measured at various points in a circuit
8. Troubleshoot an electrical circuit that has a fault

### Module 1 Activities

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 Read AC Circuit Fundamentals, pages 107-127 - Exercise 6 (Troubleshooting Methods)

Text Book

 Watch video: Basic Electrical Circuit Troubleshooting I (7:49)

<https://www.youtube.com/watch?v=N9eN2yXtt88>

 Watch video: Basic Electrical Circuit Troubleshooting II (11:28)

<https://www.youtube.com/watch?v=7IzPajv_jOA>

 Watch video: Basic Electrical Circuit Troubleshooting III (15:52)

<https://www.youtube.com/watch?v=jbwjQHYbIlU>

 Complete Quiz 122-1

See Quiz INT122-1 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 122-1.1, Lab 122-1.2 and Lab 122-1.3

See Lab Documents

 Schedule and complete Hands-on Lab 122-1.1

See INT122 1.1 Lab Document

 Schedule and complete Hands-on Lab 122-1.2

See INT122 1.2 Lab Document

 Schedule and complete Hands-on Lab 122-1.3

See INT122 1.3 Lab Document

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# Industrial Electricity 1C Module 2: Industrial Control Circuits

This module will introduce the students to the NSCC wiring boards and 120VAC control circuits.  A focus will be on more industrial standard components.  Students will wire a 3 wire control start/stop circuit from an electrical print.  A heavy focus will be on the interpretation of electrical print interpretation.  Students will also learn the basics on wire stripping, numbering and termination.

Upon completion of this module the student will be able to:

1. Identify all the components on an NSCC wiring board
2. Interpret the components on an electrical print
3. Wire a start/stop/relay circuit on the NSCC wiring board using an electrical print
4. Explain how a start/stop (3-wire) motor circuit operates
5. Explain the voltage that should be measured at various points on an electrical print
6. Explain how the N.C. overload contact works in a motor circuit
7. Wire all electrical nodes back to the terminal strip on the wiring board
8. Identify and explain the operation of pushbuttons, pilot lights and selector switch found on a control panel

### Module 2 Activities

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 Watch video: What are terminal blocks? (2:26)

<https://www.youtube.com/watch?v=75aE18iqtIM>

 Review PowerPoint: Electrical Motor Controls - Control Logix

<https://www.engr.psu.edu/cim/ie450/ie450pp10.ppt>

 Review PowerPoint: Electrical Motor Controls - Electro-mechanical Relays

<https://www.slideshare.net/DHANU3132/electromechenical-relay>

 Review PowerPoint: Electrical Motor Controls - Contactors and Magnetic Motor Starters

<https://www.slideshare.net/slideshow/contactors-relays-240887471/240887471>

 Complete Quiz 122-2

See Quiz INT122-2 Content Packaging files to upload into an LMS System

 Review Hands-on Lab 122-2.1 and Lab 122-2.2

See Lab Documents

 Schedule and complete Hands-on Lab 122-2.1

See INT122 2.1 Lab Document

 Schedule and complete Hands-on Lab 122-2.2

See INT122 2.2 Lab Document

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