

# Electronic and Electrical Troubleshooting

## Outline of Instruction

### Course Information

<b>Organization</b>	Monroe County Community College, Applied Science and Engineering Technology
<b>Developers</b>	Thomas Harrill
<b>Development Date</b>	8/26/2009
<b>Course Number</b>	ELEC-200
<b>Potential Hours of Instruction</b>	90

### Description

All Electronic and Electrical Equipment eventually wears out, breaks down or otherwise requires maintenance. Time is money to all places of business and industry. One piece of failed equipment can sometimes idle an entire factory. This is why it is necessary to have someone who is well trained in the art of Troubleshooting. This course introduces the logic and concepts of a systematic approach to troubleshooting and repair of a variety of Electrical and Electronic Equipment. Emphasis on Efficiency and Time management in the troubleshooting process will be highlighted.

Major Units:

1. Introduction to Troubleshooting
2. Electrical and Electronics Theory Review
3. Instrument Usage and Measurements
4. Troubleshooting Relays and Motor Starters
5. Troubleshooting Motor Electrical and Mechanical Problems
6. Troubleshooting Power Distribution and Quality
7. Troubleshooting Motor Controls and Drives
8. Troubleshooting Lighting Circuits
9. Troubleshooting Solenoids and Heating Elements
10. Troubleshooting Mechanical and Solid State Switches
11. Troubleshooting Diodes, Transistors, Thyristors and Integrated Circuits
12. Troubleshooting Programmable Controllers
13. Troubleshooting Alternative Energy Systems
14. Prevententive Maintenance

### Types of Instruction

<b>Instruction Type</b>	<b>Contact Hours</b>	<b>Credits</b>
Classroom Presentation	30	
On-Campus Lab	60	

### Textbooks

Mazur and Proctor. *Troubleshooting Electrical/Electronic Systems*.

### Learner Supplies

Proto-board.

Scientific Calculator.

Optional: Needle-Nose pliers, Diagonal Cutters and Wire Strippers.

## **Prerequisites**

ELEC 132 (Electronics 1)

## **Exit Learning Outcomes**

### **Program Outcomes**

- A. Develop and Demonstrate Problem Solving Skills.
- B. Develop a willingness to learn independently.
- C. Develop and demonstrate effective wiring and laboratory skills.
- D. Demonstrate Equipment/Instrumentation Competence.
- E. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams.
- F. Value Safety Training, Safe Work Practices and acknowledge Safety Standards.
- G. Demonstrate a thorough understanding of DC and AC theory and operating concepts.
- H. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and an demonstrate an understanding of process control.
- I. Utilize Virtual Instrumentation, Data Acquisition (LabView), CAI, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.

### **General Education Outcomes**

- A. Apply mathematical approaches to the interpretation of numerical information
- B. Use computer technology to communicate information
- C. Communicate ideas in writing using the rules of standard English
- D. Apply mathematical approaches to the analysis of numerical information
- E. Demonstrate an understanding of the process of scientific inquiry
- F. Use computer technology to retrieve information

### **Course Outcomes**

- 1. **Identify/Recognize Troubleshooting Levels, Logic and Procedure**
- 2. **Utilize Ohm's Law to form expectations to assist in troubleshooting circuits**
- 3. **Utilize Instrumentation to diagnose a circuit fault**
- 4. **Demonstrate/Practice Troubleshooting Relay and Motor starter faults**
- 5. **Demonstrate/Practice Troubleshooting Motor Mechanical and Electrical faults**
- 6. **Demonstrate/Practice Troubleshooting Power Distribution and Power Quality faults**
- 7. **Demonstrate/Practice Troubleshooting Motor Control and Drive faults**
- 8. **Demonstrate/Practice Troubleshooting Lighting circuit faults**
- 9. **Demonstrate/Practice Troubleshooting Solenoid, Heating Element and Switch faults**
- 10. **Demonstrate/Practice Testing Diodes, Transistors and Thyristor faults**
- 11. **Demonstrate/Practice Troubleshooting Programmable Logic Controller faults**
- 12. **Demonstrate/Practice Troubleshooting Alternative Energy system faults**
- 13. **Identify/Recognize Preventive Maintenance Procedures**

