Electronic and Electrical Troubleshooting
Outline of Instruction

Course Information
Organization
Monroe County Community College, Applied Science and Engineering Technology
Developers
Thomas Harrill
Development Date
8/26/2009
Course Number
ELEC-200
Potential Hours of Instruction
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. Preventive Maintenance

Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Classroom Presentation</td>
<td>30</td>
<td></td>
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<tr>
<td>On-Campus Lab</td>
<td>60</td>
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Textbooks

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.
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 Preventitive Maintenance Procedures