South Central College

MECA 1122  Electricity - Devices and Circuits I

Course Outcome Summary

Course Information

Description
This course provides an exploration of the basics in electricity and electronics. Topics include an overview of direct current, circuit laws, components, and use of test equipment. Students learn the basic technique of troubleshooting electric circuits, including measurement techniques, analysis of faults, and repair procedures. Teamwork, critical thinking, and problem solving are emphasized. Hands-on experience and practical applications are included.

Total Credits 3
Total Hours 64

Types of Instruction

Instruction Type Credits/Hours
Classroom Presentation
On-Campus Lab

Pre/Corequisites
None

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Learn Basic Concepts

Learning Objectives
- Review Work, Energy and Energy Conversion
- Apply Energy Conversion, Efficiency
- Identify Structure of Matter, Electric Charge and Valence Electrons
- Describe Ions, Static Charge and Static Discharge
2. **Understand Electrical Quantities and Units**
   Learning Objectives
   - Comprehend Charge, Current and Current Carriers
   - Explain the Unit of Current, Unit of Voltage and the Unit of Resistance
   - Explain Conductors, Insulators and Semiconductors
   - Review Power and Energy

3. **Interpret Basic Circuits, Laws and Measurements**
   Learning Objectives
   - Describe Circuit Essentials
   - Explain Circuit Symbols and Diagrams
   - Demonstrate how to Calculate Electrical Quantities
   - Demonstrate how to Measure Electrical Quantities

4. **Apply Ohm’s Law while conducting circuit analysis**
   Learning Objectives
   - State Ohm’s Law with reference to current, voltage, and resistance
   - Use Ohm’s Law in various circuit configurations
   - Explain Special Units and Conversion

5. **Define Multiple-Load Circuits**
   Learning Objectives
   - Identify Series Circuits
   - Identify Parallel Circuits
   - Describe Power in Multiple-Load Circuits
   - Explain Conductance
   - Explain Series - Parallel Circuits
   - Understand Voltage Dividers and Regulators

6. **Explain Complex-Circuit Analysis**
   Learning Objectives
   - Explain Simultaneous Equations
   - Know Loop-Equations Technique
   - Know Node Voltage Technique
   - Identify Superposition Theorem
   - Identify Thevenin’s and Norton’s Theorem

7. **Discuss Magnetism and Electromagnetism**
   Learning Objectives
   - Explain Magnetism, Magnets, Magnetic Fields, Flux and Poles
   - Identify Electromagnetism, Magnetic Materials, and Magnetomotive Force
   - Identify Reluctance
   - Describe DC Motor Operation, Solenoids and Relays

8. **Summarize Capacitance and Inductance in DC Circuits**
   Learning Objectives
   - Describe Basic Capacitor Action
   - Example Voltage Rating and Specifications
   - Explain Types of Capacitors and Symbols
   - Demonstrate Capacitors in Series and Parallel Circuits

9. **Lean Basic Soldering Skills**
   Learning Objectives
   - Identify soldering equipment and components
   - Describe how to solder components on a PCB and how to remove components on a PCB
   - Demonstrate properly soldered connections

10. **Operate Electrical Measurement Meters to Determine Voltage, Current, and Resistance in a**
circuit

Learning Objectives
Operate a voltmeter
Use an ammeter
Operate an ohmmeter
Describe the advantages/disadvantages of DMMs and VOMs
List the safety precautions for using electrical meters

11. Troubleshoot to Find Common Printed Circuit Board Defects and Problems

Learning Objectives
List common technician tools used for troubleshooting electrical circuits
Explain the safety procedures to protect the technician and circuits
Discuss the importance of electrostatic discharge (ESD)
Develop common troubleshooting techniques
Identify open and short circuits
Know the importance of documentation as part of the troubleshooting process

12. Contribute to a Team Capstone Course Project

Learning Objectives
As a teammember, select an appropriate capstone project
Communicate with teammembers
Create a report

13. Communicate Information with and Receive Knowledge from Local Industry Representatives

Learning Objectives
Take detailed notes from presentations provided by industry representatives
Ask questions to industry representatives during presentations and tours
Prepare a cover letter a resume

SCC Accessibility Statement
South Central College strives to make all learning experiences as accessible as possible. If you have a
disability and need accommodations for access to this class, contact the Academic Support Center to request
and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507)
332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

This material can be made available in alternative formats by contacting the Academic Support Center at 507-
389-7222.