

**WESTERN IOWA TECH COMMUNITY COLLEGE**  
**Course Syllabus**

Term:  
Course Number and Section: ELE 112 \_\_\_\_  
Course Title: Basic Electrical Theory  
Semester Hours: 3.00  
Meeting time/location:  
Instructor:  
Phone: 712.274.8733 Ext.  
E-mail: @witcc.edu  
Office Location:  
Office Hours:

**COURSE DESCRIPTION AND PREREQUISITES/COREQUISITES:**

This course will introduce the students to the fundamentals of electricity. Electrical topics will include AC and DC theory, Ohm's Law, Electrical Circuits, Electrical Power Generation, Motors, and Transformers. This course emphasizes electrical safety as students will work with energized circuits.

Prerequisite: None  
Co-requisite: None

**REQUIRED TEXTBOOKS/MATERIALS**

Holt. *Illustrated Guide to Basic Electrical Theory* Mike Holt, ISBN-13: 9781932685398

**COURSE OBJECTIVES**

The course will provide information which should enable the student to:

1. Describe the basic physical science of electricity
2. Discuss the movement of electrons in electrical conductors
3. Explain the effects of magnetism related to electricity
4. Explain current flow in an electrical circuit
5. Identify the effects and hazards involved with working around electricity
6. Describe and explain the uses of electromagnetism
7. Explain the relationship of voltage, resistance, current, and power and apply the rules of Ohms in electrical circuits
8. Perform basic algebra and math functions as they relate to electrical calculations and solve for unknown values in electrical circuits applying Ohms law and the formula wheel
9. Solve current flow calculations for multi-wire circuits
10. Identify and describe electrical generation and distribution systems
11. Discuss electrical protection devices and understand their applications
12. Describe alternating current including the terms and effects associated with its use
13. Describe and calculate for the effects of capacitance, inductance, and power factor in alternating current circuits
14. Describe the fundamental principles of electric motors, transformers, and generators
15. Calculate the efficiency of three phase motors versus single phase motors
16. Identify and describe the types of, and calculate the winding ratios in, transformers
17. State the importance of grounding and bonding in electrical circuits

**CONTENT OUTLINE:**

- I. Matter
- II. Electron Theory
- III. Magnetism
- IV. Intro to Electricity
- V. Electromagnetism
- VI. Uses of Electromagnetism
- VII. The Electrical Circuit
- VIII. Math for Electricity
- IX. Electrical Formulas
- X. Series Circuits

- XI. Parallel Circuits
- XII. Series-Parallel Circuits
- XIII. Multi-wire Circuits
- XIV. The Electrical System
- XV. Protection Devices
- XVI. Alternating Current
- XVII. Capacitance
- XVIII. Inductance
- XIX. Power Factor and Efficiency
- XX. Motors
- XXI. Generators
- XXII. Transformers
- XXIII. Grounding

**COMPETENCIES:**

At the conclusion of the course the student will be able to:

1. Demonstrate safety procedures and precautions
2. Apply Ohms Law to calculate resistance, voltage, current, and power
3. Demonstrate how magnetism can be used to produce electricity
4. Identify and utilize overcurrent, short circuit, ground, and arc-fault devices
5. Calculate to solve values in a series, parallel, and series-parallel circuits
6. Measure electrical values through the use of a multi-meter (volt, ohm, and amp probe)
7. Identify the basic symbols used in wiring diagrams and schematics for electrical devices
8. Identify and describe the purpose of circuit or device overload protection
9. Identify and describe the effects of inductance and capacitance in an electrical circuit
10. Install and measure the values of transformers in alternating current circuits
11. Differentiate between single phase and three phase current
12. Identify proper grounding and bonding procedures
13. Demonstrate and describe the effects of an ungrounded circuit

*As a comprehensive community college, our mission is to provide quality education and to economically enhance the communities we serve.*

---