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Northeast Wisconsin Technical College

## 31-413-353 022724 Electricity-Basic

### Course Outcome Summary

#### Course Information

<b>Description</b>	31-413-353 ELECTRICITY-BASIC <a href="#">...basic</a> electricity: fundamental laws and circuit analysis. (Prerequisites: Accepted into Electrical Power Distribution)
<b>Total Credits</b>	1
<b>Total Hours</b>	36

#### Course History

<b>Last Revision Date</b>	3/16/2017
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#### Employability Skills

Communicate Effectively  
Demonstrate Community and Global Accountability  
Demonstrate Personal Accountability  
Solve Problems Effectively  
Think Critically and Creatively  
Value Individual Differences and Abilities  
Work Cooperatively and Professionally

#### Program Outcomes

TSA1 - Apply electrical theory

#### Course Competencies

##### 1. Define, and explain the structure of an atom and its relationship to the electron theory.

###### Assessment Strategies

on a written exam without the aid of notes, formulas, or aids of any kind, except that the use of a calculator will be allowed where necessary

###### Learning Objectives

- 1.a. Describe the structure of an atom.
- 1.b. Identify the three major sub-atomic particles of any atom.

- 1.c. Explain the electrical characteristic of each sub-atomic particle.
- 1.d. State the laws of charges.
- 1.e. Define in atomic terms, conductor and insulator.
- 1.f. Describe the characteristics of a "free electron."
- 1.g. Write a definition of electricity.

#### Criteria

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy level of at least 75%

### **2. Define the key concepts of voltage, current, and resistance.**

#### Assessment Strategies

on a written exam, by matching or writing the definitions of essential electrical terms, without the use of aids of any kinds.

#### Learning Objectives

- 2.a. Define voltage and indicate its unit of measure.
- 2.b. Define current and its unit of measure.
- 2.c. Define resistance and its unit of measurement.
- 2.d. Match a list of important electrical terms of their definitions.
- 2.e. Describe and list the important components of any electric circuit.
- 2.f. List six causes or sources of voltage.
- 2.g. List the major effects of an electric current.
- 2.h. Explain the deference between the terms "resistor, resistance, and ohms."
- 2.i. Explain, in atomic terms, what is inside a resistor that restricts or impedes current flow.

#### Criteria

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy of 75%.

### **3. Explain the interrelationship of voltage, current, resistance, and power as described by "Ohm's Law," and apply them to solve for unknown electrical values**

#### Assessment Strategies

on a written exam without the use of aids of any kind, except that a calculator may be used as necessary.

#### Learning Objectives

- 3.a. Define "Ohm's Law."
- 3.b. Write the three equations that express the relationships of voltage, current, and resistance.
- 3.c. Write the three fundamental forms of the power equation.
- 3.d. Use the correct equations to calculate values of voltage, current, resistance, and power, of given circuits.
- 3.e. Define the term "polarity" as it refers to an electric current.

#### Criteria

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy of 75%

### **4. Define and describe resistance, and the common types of resistors used in electrical circuitry.**

#### Assessment Strategies

on a written examination, without the use of aids of any kind, except that a calculator may be used as necessary.

#### Learning Objectives

- 4.a. List and describe the major types of resistors.
- 4.b. Use a color code to identify an unknown resistor value.
- 4.c. Determine the power limitation or rating of a given resistor.
- 4.d. Describe the difference between a rheostat and potentiometer.
- 4.e. List or describe the common uses of resistors.

#### Criteria

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy of 75%

## **5. Describe the relationship between magnetism and electricity**

### **Assessment Strategies**

has accomplished the stated learning objectives to an accuracy of 75%

### **Learning Objectives**

- 5.a. List and explain the characteristics of "FLUX."
- 5.b. Use the characteristics of flux to explain the operation of given magnetic or electromagnetic devices.
- 5.c. Explain how and why a conductor, carrying a current, has a magnetic field around it.
- 5.d. Explain what is necessary to generate a voltage electromagnetically.
- 5.e. Describe or draw examples of flux pattern that would exist in give circumstances.

### **Criteria**

*Your performance will be successful when:*

on a written examination without the use of aids of any kind

## **6. Apply the basic electric meters, to measure the electrical values of voltage, current, and resistance.**

### **Assessment Strategies**

on a written examination, without the use of aids of any kind

by constructing in the lab, given circuits and correctly measuring required electrical values

### **Learning Objectives**

- 6.a. Identify the common meters used in the electrical industry.
- 6.b. Select the correct meter to make a given measurement.
- 6.c. Correctly set up a given meter to make an accurate measurement.
- 6.d. Demonstrate how to correctly connect given meters to measure various values.
- 6.e. Correctly interpret the values represented by given meter face indicators.
- 6.f. Explain the deference between a digital and analog type meter.
- 6.g. List several cautions as to meter applications.
- 6.h. Describe the major function of any meter.

### **Criteria**

*Your performance will be successful when:*

has accomplished each of the stated learning objectives to an accuracy of 75%

## **7. Identify the characteristics of, and analyze, a DC series circuit.**

### **Assessment Strategies**

on a written examination without the use of aids of any kind, except that a calculator may be used as necessary by correctly constructing a given series circuit, and measuring the circuit values to confirm the calculated values

### **Learning Objectives**

- 7.a. Define a series circuit.
- 7.b. List the necessary components of a series circuit.
- 7.c. Write the equations for calculating total values of resistance.
- 7.d. Describe the characteristics of current through each component in a series circuit.
- 7.e. Correctly build an example of a given series circuit by following a circuit wiring diagram.
- 7.f. Calculate all the electrical values of the above mentioned circuit.
- 7.g. Measure and confirm all values.
- 7.h. List common examples of series circuit applications.
- 7.i. Explain the limitations of a series circuit.

### **Criteria**

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy of 75%

## **8. Identify the characteristics of, and analyze, a DC parallel circuit**

### **Assessment Strategies**

on a written examination, without the notes or aids of any kind, except that a calculator may be used as necessary.

by correctly constructing a parallel circuit, in the lab, and correctly measuring the calculated circuit values.

### **Learning Objectives**

- 8.a. Define a parallel circuit.
- 8.b. State the characteristic of voltage across each component, and relate these values to the source voltage.
- 8.c. Calculate the total resistance of a given parallel circuit.
- 8.d. Calculate each branch current, and determine the total current of a parallel circuit.
- 8.e. State the relationships of branch values to the total values of a parallel circuit.
- 8.f. Write the three equations for calculating the total resistance of a parallel circuit.
- 8.g. Explain the effect of a short across any branch of a parallel circuit.
- 8.h. Calculate the power of each branch, and total power of a parallel circuit.
- 8.i. Explain the necessity of using the correct over current device to protect a parallel circuit
- 8.j. Analyze a given parallel to by calculating all the electrical values of the circuit.
- 8.k. Construct, in a lab, a parallel circuit. Calculate all values and correctly measure each

### **Criteria**

*Your performance will be successful when:*

has accomplished the stated learning objectives to an accuracy of 75%.

## **9. Analyze a DC compound circuit**

### **Assessment Strategies**

on a written examination, without the use of notes or aids of any kind, except that a calculator may be used as necessary

### **Learning Objectives**

- 9.a. Define and draw an example of a compound circuit.
- 9.b. State the rules applied to the analyses of a compound circuit.
- 9.c. Demonstrate how to reduce a compound circuit to a singular equivalent resistive value.
- 9.d. Calculate the total resistance of a given compound circuit.
- 9.e. Calculate the current through each component of a compound circuit.
- 9.f. Calculate the total current of a given compound circuit.
- 9.g. Calculate the voltage drop of each component of a compound circuit.
- 9.h. Calculate the power of each component and the total power of a compound circuit.

### **Criteria**

*Your performance will be successful when:*

has accomplished all stated learning objectives to an accuracy of 75%