

**Fox Valley Technical College**

**10660111 DC Circuits 2**

**Course Outcome Summary**

**Course Information**

<b>Description</b>	Covers basic parallel and series-parallel circuits and their properties. Examines the theory, application and design of series-parallel circuits, such as loaded and unloaded voltage dividers and the Wheatstone bridge. Laboratory activities are performed to verify the theory.
<b>Career Cluster</b>	Science, Technology, Engineering and Mathematics
<b>Instructional Level</b>	Associate Degree
<b>Total Credits</b>	1.00
<b>Total Hours</b>	27.00

**Types of Instruction**

**Instruction Type**

Lab and Lecture/Flexible

**Credits/Hours**

1 Credit/27  
Hours

**Course History**

<b>Revised By</b>	Kaye Krueger (kruegek)
<b>Last Approval Date</b>	9/11/2014

**Pre/Corequisites**

Corequisite DC Circuits 1 (10-660-110)

**Textbooks**

Electronics Fundamentals: Circuits, Devices, and Applications  
Floyd, Thomas L.; Buchla, David  
Prentice-Hall  
ISBN: 9780135072950  
8th Edition

DC Circuits 1, 2, 3; AC Circuits 1, 2 - Curriculum Manual  
Ken Holmes & Ben Gardner  
Fox Valley Technical College  
ISBN: 660110R070714

## Employability Essentials

- 1. Act Responsibly - Apply ethical standards in both personal and professional behavior.**  
*Status Active*
- 2. Adapt to Change - Anticipate changes and positively respond to them.**  
*Status Active*
- 3. Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.**  
*Status Active*
- 4. Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.**  
*Status Active*
- 5. Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.**  
*Status Active*

## Program Outcomes

- 1. Apply electronic theory to practice.**  
*Type TSA Status Active*

### Criteria

- 1.1. You mathematically analyze a circuit or system.
- 1.2. You simulate a circuit or system.
- 1.3. You construct a circuit or system according to schematics or other documentation.
- 1.4. You perform circuit or system measurements to collect data.
- 1.5. You analyze data to validate predicted outcome.

- 2. Operate test equipment.**  
*Type TSA Status Active*

### Criteria

- 2.1. You demonstrate measurement of electrical and/or electronic signals.
- 2.2. You demonstrate measurement of electrical and/or electronic quantities.
- 2.3. You demonstrate measurement of electrical and/or electronic components.
- 2.4. You use test equipment to generate electrical and/or electronic signals.
- 2.5. You apply appropriate safety precautions.

- 3. Build electronic circuits and systems.**  
*Type TSA Status Active*

### Criteria

- 3.1. You assemble a prototype for operation.
- 3.2. You demonstrate soldering and de-soldering techniques.
- 3.3. You apply appropriate antistatic precautions.
- 3.4. You identify appropriate interfaces.
- 3.5. You set up programmable devices and/or systems.
- 3.6. You apply appropriate safety precautions.

- 4. Evaluate the operation of electronic circuits or systems.**  
*Type TSA Status Active*

### Criteria

- 4.1. You determine the correct operation of circuits or systems.

- 4.2. You identify incorrect operation of circuits or systems.
- 4.3. You isolate causes of failures in circuits or systems.
- 4.4. You correct failures in circuits or systems.

**5. Communicate technical information.**

*Type*      *TSA*                      *Status*      *Active*

**Criteria**

- 5.1. You interpret electrical and/or electronic diagrams.
- 5.2. You create electrical and/or electronic diagrams.
- 5.3. You interpret technical reports and documents.
- 5.4. You use appropriate terminology in speaking and writing.
- 5.5. You interpret documentation of electronic devices and systems.
- 5.6. You locate necessary resources and pertinent information to perform work functions.

**Course Competencies**

**1. Analyze resistive parallel circuits.**

*Domain*    *Cognitive*                      *Level*      *Analyzing*                      *Status*      *Active*

**Assessment Strategies**

- 1.1. Exam

**Criteria**

*Performance will meet expectations when:*

- 1.1. you achieve a 70% or better.

**Learning Objectives**

- 1.a. Solve parallel circuit problems by calculating the following parameters:
  - A. Total resistance
  - B. Total current
  - C. Total voltage
  - D. Total power
  - E. Total conductance
  - F. Voltage drops, resistance, currents and power dissipated at individual resistors
- 1.b. Explain the effects on the circuit parameters listed in objective 1 when an open component develops.
- 1.c. Explain the effects on the circuit parameters listed in objective 1 when a shorted component develops.
- 1.d. Determine how the current supplied by batteries can be increased by connecting several in parallel.
- 1.e. Explain the effects on the circuit parameters listed in objective 1 when the resistor value in one of the parallel branches is changed.
- 1.f. Use the three standard formulas for finding equivalent resistance for two or more resistors in parallel.
- 1.g. Describe the technique required to measure the value of a resistor in one branch or the total resistance of a parallel circuit that is connected to a power supply.
- 1.h. Describe the relationship between wattage and resistance in a parallel circuit.
- 1.i. Describe how resistance affects current in a parallel branch.
- 1.j. Explain how total current and total resistance are affected by adding parallel branches.
- 1.k. Construct, using a schematic diagram, a parallel circuit on an experiment board, and use meters to measure voltages and currents throughout the circuit.
- 1.l. Determine, when given the current, resistance, or wattage values of loads connected in parallel, the maximum number of branches that can be connected to a power supply before a fuse is blown.

**2. Analyze resistive series-parallel circuits.**

*Domain*    *Cognitive*                      *Level*      *Analyzing*                      *Status*      *Active*

**Assessment Strategies**

- 2.1. Exam

**Criteria**

*Performance will meet expectations when:*

- 2.1. you achieve a 70% or better.

### Learning Objectives

- 2.a. Define the term "series-parallel (combination) circuit" with regard to the physical and electrical description.
- 2.b. Solve combination circuit problems by calculating the following parameters:
- A. Total resistance
  - B. Total current
  - C. Total voltage
  - D. Total power
  - E. Total conductance
  - F. Voltage drops, resistance, currents and power dissipated at individual resistors
- 2.c. Draw current paths on schematic diagrams of series-parallel networks.
- 2.d. Explain what is meant by the terms branching points and converging current points in series-parallel networks.
- 2.e. Use appropriate test equipment to analyze and troubleshoot series-parallel networks.

### 3. Analyze potentiometers, rheostats, voltage divider circuits, and Wheatstone bridge circuits.

*Domain Cognitive Level Analyzing Status Active*

### Assessment Strategies

- 3.1. Exam

### Criteria

*Performance will meet expectations when:*

- 3.1. you achieve a 70% or better.

### Learning Objectives

- 3.a. Calculate the voltages and currents in voltage divider circuits.
- 3.b. Determine the effect of a resistive load on a voltage divider circuit.
- 3.c. Describe how a potentiometer used in a voltage divider affects the voltage and current values when its wiper arm is moved.
- 3.d. Describe how a rheostat in a series circuit affects the voltage and current values when its wiper arm is moved.
- 3.e. Predict and explain how shorts and opens in series, parallel, and series-parallel circuits affect voltage, current and resistance values.
- 3.f. Determine the type of defect that exists in a series-parallel circuit when given voltage drops in the faulty circuit.
- 3.g. Draw a schematic diagram of a Wheatstone bridge, and explain the operation of a Wheatstone bridge circuit.
- 3.h. Calculate the value of an unknown resistor in a balanced Wheatstone bridge.
- 3.i. Calculate the output voltage and polarity of an unbalanced Wheatstone bridge.
- 3.j. Use Ohm's law, Kirchhoff's laws and voltage-divider and current-divider formulas to predict voltage, resistance, and current values of a series-parallel circuit.
- 3.k. Use a voltmeter, ammeter, and ohmmeter to measure various electrical properties of a series-parallel circuit.

### Grant Award

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## Course Learning Plans and Performance Assessment Tasks

Type	Title	Source	Status
PAT	Series-Parallel Circuits Exam	Course	Active
PAT	Voltage Dividers, Potentiometers, Rheostats, Wheatstone Bridge and Troubleshooting Exam	Course	Active
PAT	Parallel Circuits Exam	Course	Active
LP	Parallel Circuits	Course	Active
LP	Series-Parallel Circuits	Course	Active
LP	Voltage Dividers, Potentiometers, Rheostats, Wheatstone Bridge and Troubleshooting	Course	Active