



### Course Information

Division	Applied Science and Engineering Technology
Contact Hours	90
Total Credits	4.0

### Prerequisites

**ELEC 125**  
MATH 124 or 151 or 159 or 164

### Course Description

Topics covered are: Phasor analysis of series AC circuits, both resistor-capacitor and resistor-inductor; phasor analysis of parallel AC circuits, both RC and RL; magnetism; magnetic field in a coil (inductor); inductive transient response to switched DC; impedance of complex AC circuits; oscilloscope phase measurement techniques; power factor in AC circuits; series-resonant LC circuits; parallel-resonant LC circuits; filtering using resonant LC circuits; the j-operator; voltage division in DC and AC; bridge circuit analysis in DC and AC; Thevenin's theorem in DC and AC; computer-aided circuit analysis in DC and in AC frequency domain.

**This course is a required core course for students pursuing a degree in**

Electrical Engineering Technology

### Program Outcomes Addressed by this Course:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
- F. Demonstrate Equipment/Instrumentation Competence
- G. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams
- H. Demonstrate effective Oral Presentation Skills
- I. Value Safety Training, Safe Work Practices and acknowledge Safety Standards
- J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
- K. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control.
- L. Demonstrate a thorough understanding of DC and AC theory and operating concepts.



## Course Outcomes

1. Identify/Recognize: a series resistive/reactive circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
- G. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams
- J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)

2. Identify/Recognize: a phasor diagram that represents the magnitude and phase relationships for the sine-wave ac voltages existing in a series, parallel, or compound resistive/reactive circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
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3. Identify/Recognize: a parallel resistive/reactive circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
- G. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams
- J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)



4. Identify/Recognize: a Lissajous (X-Y) scope display conveying an out-of-phase relationship between the X signal and the Y signal

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
- G. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams
- J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)

5. Demonstrate/Practice: complete analysis (all voltages and currents) of complex dc circuits

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
- G. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams
- J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)

6. Demonstrate/Practice: the calculation, and measurement of the magnitude and phase relationships among voltages or among current and voltages in a series resistive/reactive circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
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7. Demonstrate/Practice: the calculation, and measurement of the magnitude and phase relationships among currents or among source voltage and currents in a parallel resistive/reactive circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
- E. Develop and demonstrate effective wiring and laboratory skills.
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8. Demonstrate/Practice: the testing of a series or parallel-resonant LCR circuit to determine resonant frequency, bandwidth, and data points for plotting a complete frequency-response curve

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- D. Develop a willingness to learn independently.
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9. Demonstrate/Practice: the power-factor correction technique of connecting a capacitor in parallel with an inductive ac circuit

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10. Demonstrate/Practice: the use of the polar-to-rectangular (PYR) and rectangular-topolar (RYP) functions of a scientific hand-held calculator to facilitate the analysis of ac circuits

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- E. Develop and demonstrate effective wiring and laboratory skills.
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11. Demonstrate/Practice: the use of the j-operator [p-1 operator) to calculate impedances, currents, and voltages in a complex ac circuit

**Applies to Program Outcome**

- A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
- C. Develop and Demonstrate Problem Solving Skills.
- D. Develop a willingness to learn independently.
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12. Demonstrate/Practice: the use of the node-analysis method for and-analyzing a multisource ac circuit

**Applies to Program Outcome**

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MONROE COUNTY  
COMMUNITY COLLEGE

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# Course Outcome Summary

**Required Program Core Course**

**ELEC 133 Circuit Analysis**

Updated: 4/3/2019  
By: Mark G Locher Sr