



MONROE COUNTY
COMMUNITY COLLEGE

Course Outcome Summary

Required Program Core Course

ELEC 145 Instrumentation and Data Acquisition

Course Information

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

Prerequisites ELEC 125
ELEC 132 Co-Requisite

Course Description

This course will provide students with the necessary background, theory and laboratory experience to utilize Windows-based computers, LabView software, interface hardware and software for data recording, analysis and on-line control of industrial processes. Multiple inputs and data logging, A/D conversion and various computer interface bus standards are discussed and implemented. This course also examines the characteristics and limitations of common electronic instruments. Topics covered include safety and lab techniques, op-amp circuits, AC and DC meters, digital multimeters, oscilloscopes, potentiometers and potentiometric bridges, transducers, signal-processing circuits, fiber optics and automatic test equipment.

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.



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1. Identify/Recognize safety procedures and apply proper lab techniques with troubleshooting knowledge in basic areas. Define measurement and recognize primary/secondary measurement standards. Apply basic statistical methods to handle measurement errors.
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 - D. Develop a willingness to learn independently.
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 - 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)
2. Recognize the basic theories to design various Analog or Digital Multi-meters. Recognize the input resistance, capacitance, and frequency to limit accuracy of VOMs, DVMs, and Oscilloscopes.
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 - H. Demonstrate effective Oral Presentation Skills
 - I. Value Safety Training, Safe Work Practices and acknowledge Safety Standards
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 - L. Demonstrate a thorough understanding of DC and AC theory and operating concepts.
3. Calculate precision and accuracy as well as to distinguish among the three types of linearity specifications and calibrate a given instrument to specified accuracy.
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 - D. Develop a willingness to learn independently.



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- 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
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 - L. Demonstrate a thorough understanding of DC and AC theory and operating concepts.
4. Recognize/understand the basic theories, operations of Oscilloscopes for measurement.
Applies to Program Outcome
- 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.
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5. Recognize the basic theories, operations of Potentiometer, Potentiometric bridge, and applications. Understand the advantages and disadvantages of a Potentiometric bridge as a measure device.
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 - J. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
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6. Identify/Recognize suitable transducers for given physical quantity and tell whether it is active or passive.

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7. Recognize signal-process circuits and various ranges of signals as the inputs and changed to a common output. Understand the operations to convert analog signals to corresponding digital signals (A/D Conversions) and digital signals to analog signals (D/A Conversion).

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 - 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.
8. Recognize fiber optics, automatic test equipment and understand the use of LabView software to process the measurement data.

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Updated: 4/3/2019
By: Mark G Locher Sr
Updated: 2/1/2022
By: Alex Wan