

University of Arkansas - Fort Smith
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General Syllabus

ELEC 3933 Industrial Control Systems

Credit Hours: 3

Lecture Hours: 2

Laboratory Hours: 2

Prerequisite: Consent of department head

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Covers basic continuous control, control strategy design and application, integration, and software instrumentation maintenance and troubleshooting.

B. Additional Information

A variety of electromechanical sensors and actuators are studied and how they can be used in computer controlled systems. A temperature control system with PID feedback is designed, built and tested. AC/DC motor control with speed/position feedback is studied, and inverter/vector AC motor drives are configured and programmed in lab. Laboratory experience is designed to reinforce the student's understanding of device and systems theory but emphasizes topics helpful in testing and troubleshooting.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Describe, diagram and design transducer interfaces and analog signal conditioning circuits.
2. Design, build and test a closed loop, temperature control system using a standard industrial controller with PID feedback algorithm.
3. Specify proper AC motor and drive for given torque, horsepower or load/speed application using standard catalog parts.
4. Design, develop and program an inverter/vector AC motor and drive for a given speed/position application.
5. List the safety hazards and itemize safety rules association with working on electrical power control systems.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking - Students will analyze and troubleshoot AC/DC motor control with speed/position feedback and inverter/vector AC motor drives to determine faults in advanced motor control circuits in the laboratory.

Quantitative Reasoning - Students must be able to utilize mathematics to solve various electrical problems

III. Major Course Topics

- A. Introduction to process control systems
- B. Analog/digital signal conditioning circuits
- C. RTD, thermistor and thermocouple transducers
- D. Mechanical transducers, displacement and strain
- E. Motion, pressure and flow transducers
- F. Optical transducers and photo detectors
- G. Optical sources and laser characteristics
- H. Final control elements and actuators
- I. Hardware/software; PID closed loop