

University of Arkansas - Fort Smith
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General Syllabus

ELEC 2403 Introduction to Robotics

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: ELEC 1243 Introduction to Programming, ELEC 1263 Industrial Electricity, and ELEC 1863 Digital Fundamentals, or consent of department head.

Effective Catalog: 2018-2019

I. Course Information

A. Catalog Description

Introduction to the principles of industrial robotics, related systems, and applications. Enables the student to learn the technical aspects of robotics, and covers power supply systems, degrees of freedom, programming methods, sensors, end effectors, implementation planning, and system maintenance.

B. Additional Information

The promise of high productivity factories is being realized today by the use of robotics. Since the first industrial robot was installed at a U.S. automotive plant in 1961, robotics technology has become an integral factor in most types of manufacturing. Robots are widely used for applications that require extreme precision, for repetitive and tedious tasks, and for work that is considered unpleasant or dangerous for humans. Robots are also vital components of flexible manufacturing systems, which allow robotic configurations to be quickly changed to meet production requirements.

The factory engineer or technician of today is faced with the selection, application, operation, programming, documentation, and troubleshooting of robot systems on a factory floor. In many factories, even the operators are taught basic operation of the robot so they can start a process safely and effectively. In the factory of the future, robotic literacy may become as important as personal computer literacy has become in the office of today.

II. Student Learning Outcomes

A. Subject Matter

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

1. Explain and apply the principles of robotics.
2. Describe the power supplies and movement systems of a robot.
3. Describe the sensing and end-of-arm tooling used by the robot.
4. Define design requirements for robot control systems.
5. Describe the maintenance requirements of a robot system.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking – Students will analyze and troubleshoot failures in robot systems using the resources of the robotics lab. Students will identify proper analytical troubleshooting techniques to determine failures in robot hardware and software.

Quantitative Reasoning - Students will utilize mathematics to solve various robot positioning and software problems.

III. Major Course Topics

- A. Introduction to industrial robotics
- B. Fundamentals of robotics
- C. Programming the robot
- D. Industrial applications
- E. Electromechanical systems
- F. Fluid power systems
- G. Sensors
- H. End effectors
- I. Computer systems and digital electronics
- J. Interfacing and vision systems
- K. Maintaining robotic systems
- L. Robots in modern manufacturing
- M. The future of robotics