

ELEC 184 Course Outline as of Fall 2024**CATALOG INFORMATION**

Dept and Nbr: ELEC 184 Title: INDUSTRIAL ROBOTICS

Full Title: Industrial Robotics Fundamentals

Last Reviewed: 5/8/2023

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.50	17.5	Lecture Scheduled	43.75
Minimum	3.00	Lab Scheduled	1.50	8	Lab Scheduled	26.25
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 87.50

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:

In this course students will receive an introduction to the control of autonomous industrial robots. Students will learn the fundamentals of basic robotics and learn how to control the Fanuc LR-Mate 200id robotic arm using a teach pendant and 3D control software.

Prerequisites/Corequisites:**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: In this course students will receive an introduction to the control of autonomous industrial robots. Students will learn the fundamentals of basic robotics and learn how to control the Fanuc LR-Mate 200id robotic arm using a teach pendant and 3D control software. (Grade Only)

Prerequisites/Corequisites:

Recommended:

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree: **Area** Effective: Inactive:

CSU GE: **Transfer Area** Effective: Inactive:

IGETC: **Transfer Area** Effective: Inactive:

CSU Transfer: Effective: Inactive:

UC Transfer: Effective: Inactive:

CID:

Certificate/Major Applicable:

Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Demonstrate safety procedures when operating robots.
2. Program a set of movements on the teach pendant.
3. Simulate robot movement in simulation software.

Objectives:

At the conclusion of this course, the student should be able to:

1. Operate a robot in joint and world modes in real time.
2. Create and change teach pendant programs.
3. Modify a program.
4. Abort, access, test, and run programs.
5. Add an end-of-arm tool.
6. Operate a robot in simulation software.

Topics and Scope:

I. Robot System

- A. Major/minor axes
- B. Joints and links

II. Robot Operations

- A. Safety
 1. Programming safety precautions
 2. Mechanical safety precautions
- B. Teach pendant
 1. Function menu
 2. Status indicators
 3. Moving a robot in joint and world modes
 4. Create and change teach pendant programs

- 5. Abort, access, test, and run programs
- III. Handling Tool Operation and Programming
 - A. Frames
 - 1. Cartesian coordinate system
 - 2. World, tool, user, and jog frames
 - B. Input/Output (I/O)
 - 1. I/O signals
 - 2. Configure I/O
 - 3. Controller I/O
 - C. Program instruction
 - 1. Motion programs
 - 2. Motion instructions
 - D. Modify a program
 - E. Macro commands
 - F. Robot setup for production
 - G. File management
- IV. Roboguide-HandlingPRO
 - A. Move a robot in 3D
 - B. Adjust the display
 - C. View multiple windows
 - D. Edit robot properties
 - E. Add a part and define the part in a cell
 - F. Add an end-of-arm tooling
 - G. Defining a relationship between tool and part
 - H. Create two fixtures for pick and placement
 - I. Create and run a program
 - J. Create an animated AVI file of the workcell
 - K. Calibrating the virtual workcell to the real cell
 - L. Add another robot to the workcell
 - M. Set the I/O to avoid robot collision

All items in the topics and scope are covered in the lecture and lab portions of the course.

Assignment:

Lecture-Related Assignments:

1. Reading (10-30 pages per week)
2. Homework assignments (4-8)
3. Quizzes (2-6)
4. Final exam

Lab-Related Assignments:

1. Laboratory assignments including demonstration of robot operation (5-12)
2. Program documentation (4-8)

Representative Laboratory Assignments:

1. Moving a robot in joint and world modes
2. Create and change teach pendant programs
3. Abort, access, test, and run programs
4. Use teach pendant to draw a circle
5. Use teach pendant to write a name
6. Operate a robot in 3D simulation software

7. Add a part and define the part in a cell
8. Create an AVI file of the 3D workcell

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Program documentation

Writing
20 - 50%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework assignments

Problem solving
20 - 30%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Laboratory assignments including demonstration of robot operation

Skill Demonstrations
10 - 30%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes; final exam

Exams
20 - 40%

Other: Includes any assessment tools that do not logically fit into the above categories.

None

Other Category
0 - 0%

Representative Textbooks and Materials:

Instructor prepared materials