

**ELEC 184 Course Outline as of Spring 2022****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:**

An introductory course 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: An introductory course 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:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>		Effective:	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Not Certificate/Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

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

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

### **Objectives:**

During this course students will:

1. Move 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. Move a robot in 3D 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 & 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/run a program

#### J. Create an 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

### Assignment:

#### Lecture-Related Assignments:

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

#### Lab-Related Assignments:

1. Laboratory assignments (5-12)
2. Program documentation (4-8)

#### Typical 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. Move 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 and 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