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