

Quinsigamond Community College – Business and Technology Division
Course Syllabus – Spring 2018

Course Number: ELM 260-01 **Course Title:** Industrial Robotics
Credits: 4 **Meeting time:** Thursday, 9:00 AM – 1:50 PM

Instructor: Jim Heffernan **Phone:** QCC: 508-854-2739
Office: 118Q **Email:** jheffernan@qcc.mass.edu

Prerequisite: **ELT 130**

Course Description:

This course is an introduction to robotics as used in modern industry. Students explore coordinate configurations, control systems, drive systems, robot vision systems, and various methods of programming. The relationship of robot applications to other automated technologies is discussed and investigated. In the laboratory, students complete a series of projects that require them to apply robots to a variety of work cell tasks. Students practice industrial robot safety at all times.

Student Outcomes:

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

1. Explain and practice safety procedures when working with industrial robots.
2. Use a teach pendant to program a robot to perform a variety of tasks.
3. Use robot simulation and programming software to program a robot.
4. Describe the mechanical components of industrial robots, including motors, couplings, gears and drives.
5. Describe common robot axes and explain how they are used to control robot movement.
6. Describe the various types of sensors used in robot systems and explain how they are used in industrial robotics.
7. Identify typical problems with robot systems and identify common causes and solutions.
8. Describe robot applications and their relationship to other automated technologies.
9. Complete the requirements for Fanuc CERT Robotics Certification.

Course Materials:

Handling Tool Operations and Programming – Student Lab Manual (copies available in lab 111Q)

Other course materials will be posted on the Blackboard site for this course at:

<https://mycourses.qcc.edu/>

Methodology of Instruction:

1. PowerPoint presentations
2. In-class demonstrations using equipment and simulations of equipment
3. In-class problem solving
4. Hands-on laboratory activities

Course Grading:**a. Evaluation:**

Homework:	20%
Quiz Grades:	20%
Laboratory Work:	60%

Numeric grades will be converted into letter grades using the table in the QCC catalog.

- b. Certification:** The Fanuc CERT (Certified Education Robot Training) is embedded in the course. To obtain the certification, you must satisfactorily complete the required labs from the student manual, and pass a certification test with a score of 80% or above.
- c. Attendance** is expected and required at each scheduled class session. Attendance in class is vital to successful completion of the course. It also reflects the development of good work habits. When employers call to ask about a student's performance, the first question they ask is usually regarding attendance in class.
- d. Cheating and copying** will not be tolerated. Two assignments that contain identical or very similar text will BOTH receive a grade of zero.
- e. Accessibility**
If you have a disability which may require an accommodation, please notify me as soon as possible. You are responsible for forwarding your Accommodation Letter to me and discussing arrangements for this course. Your accommodations for this course begin upon my receipt of your Accommodation Letter; accommodations are not retroactive. You may request accommodations at any time during the semester, but instructors must be provided with reasonable notice prior to exams or deadlines. Disability Services works to promote access to ensure an accessible college experience for students. If you have further questions, contact Disability Services. All discussions are confidential.

Contact Information for Disability Services & Assistive Technology:

Call: 508-854-4471, Sorenson Video Phone: 508-502-7647

Email: disabilityservices@qcc.mass.edu

ELM 260 Industrial Robotics – Course Outline – Spring 2018

Date	Topic(s)	Projects and Assignments
<p align="center">1/18</p>	<ul style="list-style-type: none"> • Overview of Course • Overview of Industrial Robots • Industrial Robot Safety • Work Envelope and Axis Limits • Dual-Check Safety (DCS) • The Robot System • Joint Jogging vs. World Jogging 	<p>Complete eLearn Course 1: Robot Operations</p> <p>Lab 1: Powering Up and Joint Jogging Lab 2: Jog the Robot in WORLD Mode Lab 3: QUICK/FULL MENU Lab 4: Verify Mechanical Zero Lab 5: View Axis Limits Lab 6: Viewing the Version Identification</p>
<p align="center">1/25</p>	<ul style="list-style-type: none"> • Robot Teaching and Programming Using a Teach Pendant • Overview of the Fanuc Teach Pendant • Creating and Writing a Program • Motion Instructions • Overview of Frames • WORLD Frame (USER Frame 0) • USER Frame • TOOL Frame • Jog Frame (JGFRM) • Simulating a Robot with Roboguide 	<p>Lab 7: TOOL Frame Setup Lab 8: Create USER and JOG Frames Lab 9: Create a Program</p> <p>Roboguide: Labs 7 – 9</p>
<p align="center">2/1</p> <p align="center">2/8</p>	<ul style="list-style-type: none"> • Motion Instructions (continued) 	<p>Complete eLearn Course 2: Handling Tool Ops & Programming</p> <p>Lab 10: Create Position Registers Lab 11: Motion Instructions Lab 12: Create a Program Lab 13: Create a Shape Program</p> <p>Roboguide: Labs 10 – 13</p>
<p align="center">1/15</p>	<ul style="list-style-type: none"> • Editing a program • Branching • Calling programs 	<p>Lab 14: Select/Modify and Execute Lab 15: Modifying Programs Using Branching Instructions Lab 16: Calling Programs</p>

		Roboguide: Labs 14 – 16
2/22	<ul style="list-style-type: none"> • Register Instructions • Position Register - OFFSET 	Lab 17: Calling Programs with IF/SELECT Instructions Lab 18: Register Instructions Lab 19: Calling Programs / Register Instructions Lab 20: Position Register - OFFSET Roboguide: Labs 17 – 20
3/1	<ul style="list-style-type: none"> • User Frame Applications • Tool Frame Applications 	Complete eLearn Course 3 - HandlingPRO Hands-On Lab R01: Pick and Place a Peg
3/8	<ul style="list-style-type: none"> • Input/Output • Macros • Program Adjust • File Management 	Lab 21: Input/Output Lab 22: Macro Commands Lab 23: Program Adjust Lab 24: Program and File Manipulation Roboguide: Labs 21 & 22
3/15	Spring Break – no class	
3/22 3/29	<ul style="list-style-type: none"> • Robot Applications 	Hands-On Lab R02: The Domino Challenge
4/5 4/12 4/19	<ul style="list-style-type: none"> • Robot Applications 	Student Projects
4/26	<ul style="list-style-type: none"> • Fanuc CERT Test 	Student Projects
5/3		Final Project Presentations

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