



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

**ROBOTICS  
MEC3494 3 Credit Hours**

**Student Level:**

This course is open to high school and post-secondary level students.

**Catalog Description:**

**MEC 3494 - ROBOTICS (3 hrs)**

The student will develop programs to control servo and non-servo robots as well as continuous path servo robots, to interface robots into an automated system, and to maintain the operation of multi-task robotic systems within operating parameters.

**Prerequisites:**

None

**Controlling Purpose:**

This course is designed to help the student increase their knowledge regarding fundamentals of Robotics as they apply to Industrial/Manufacturing environments.

**Learner Outcomes:**

Upon completion of the course, the student will be able to demonstrate a proficiency in basic robotics with strong emphasis on in-class laboratory actual demonstrations and learning.

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

**Units Outcomes and Criterion Based Evaluation Key for Core Content:**

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the

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less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.

- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

<b>UNIT 1: Introduction to Industrial Robots</b>						
Outcomes: Upon completion of this unit, the student will be able to successfully understand background knowledge related to industrial robotics.						
A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe how the robot industry was born and the two major reasons why robots became a factor in manufacturing automation.
						Name the external and internal challenges present for every manufacture.
						Define robotics and computer integrated manufacturing.
						Classify a production operation into one of five categories.
						Name and describe all the elements of a robot system.
						Define eleven prerequisite terms used most frequently in robotic literature.
						Explain safe robot practices.

## UNIT 2: Robot Classification

Outcomes: Upon completion of this unit, the student will be able to successfully classify and organize robotics systems.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Classify a robot based on arm geometry, power sources, applications, control techniques, and path control.
						Recognize and describe the motion of the Cartesian, cylindrical, spherical and articulated robot arm configurations.
						Calculate the torque delivered to the robot arm through the application of the following drive systems: belt and pulley, chain, gears, ball-screw, and harmonic.
						Describe the operation of servo and non-servo robot systems.
						Calculate the transfer function and other operational parameters for the three positional feedback devices; potentiometer, optical encoder, and resolver.

## UNIT 3: Human Interface: Operator Training, Acceptance, and Problems

Outcomes: Upon completion of this unit, the student will be able to successfully recognize issues associated with human to robot interactions.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Describe the general training program for all employees where robot automation is being implemented.
						Describe the operator and maintenance training program for affected employees where robot automation is being implemented.
						Describe the effect of 24/7 on manufacturing and on human workers.
						Discuss the area of resistance to automation normally present and some techniques used to overcome it.

## UNIT 4: Work-Cell Design Case Study

Outcomes: Upon completion of this unit, the student will be able to successfully integrate a robot into a work environment.

A	B	C	D	F	N	Specific Competencies
						Demonstrate the ability to:
						Completely design an automated work cell including robotics, gripper technology sensors, safety, supporting work-cell hardware, a cell control architecture, machine and system programming and justification.
						Identify one or more members of the design team whose training and skills are similar to your own.
						Describe how an automation design team interacts in the design process.

### **Projects Required:**

As assigned

### **Textbook:**

Contact Bookstore for current textbook.

### **Materials/Equipment Required:**

None

### **Attendance Policy:**

Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

### **Grading Policy:**

The grading policy will be outlined by the instructor in the course syllabus.

### **Maximum class size:**

Based on classroom occupancy

### **Course Timeframe:**

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

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**Refer to the following policies:**

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

**Disability Services Program:**

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability, which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.