



## COURSE OUTLINE: RAA108 - ROBOT PERIPH & COMP

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<b>Course Code: Title</b>	RAA108: ROBOT PERIPHERALS & COMPONENTS
<b>Program Number: Name</b>	4068: ROBOTICS AUTOMATION
<b>Department:</b>	ROBOTICS GRADUATE CERTIFICATE
<b>Semesters/Terms:</b>	19F
<b>Course Description:</b>	Robotics peripherals explores the general and technical aspects of industrial robots peripherals, and their application. The objective of this course is to introduce students to peripheral devices associated with automation cells. A variety of hardware and software devices and applications will be covered including end effectors, sensors, conveyors, line tracking encoders and safety devices.
<b>Total Credits:</b>	4
<b>Hours/Week:</b>	5
<b>Total Hours:</b>	60
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Vocational Learning Outcomes (VLO's) addressed in this course:</b>	<b>4068 - ROBOTICS AUTOMATION</b>
<b>Please refer to program web page for a complete listing of program outcomes where applicable.</b>	VLO 2 Plan and lead the installation of new industrial equipment and its physical and digital integration with existing systems.
	VLO 5 Validate and optimize the functioning of motor, drive, control, and robotic systems.
	VLO 6 Integrate budgetary, technical, functional and safety considerations in the design and optimization of custom automation solutions.
<b>Essential Employability Skills (EES) addressed in this course:</b>	EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
	EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.
	EES 3 Execute mathematical operations accurately.
	EES 4 Apply a systematic approach to solve problems.
	EES 5 Use a variety of thinking skills to anticipate and solve problems.
	EES 6 Locate, select, organize, and document information using appropriate technology and information systems.
	EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.
	EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
	EES 10 Manage the use of time and other resources to complete projects.
	EES 11 Take responsibility for ones own actions, decisions, and consequences.
<b>Course Evaluation:</b>	



**Other Course Evaluation & Assessment Requirements:**

Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed. Smart phones are not acceptable for use as a calculator during a test or quiz.

Grade  
 Definition Grade Point Equivalent  
 A+ 90 - 100% 4.00  
 A 80 - 89%  
 B 70 - 79% 3.00  
 C 60 - 69% 2.00  
 D 50 - 59% 1.00  
 F (Fail) 49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.  
 S Satisfactory achievement in field /clinical placement or non-graded subject area.  
 U Unsatisfactory achievement in field/clinical placement or non-graded subject area.  
 X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.  
 NR Grade not reported to Registrar's office.  
 W Student has withdrawn from the course without academic penalty.

**Course Outcomes and Learning Objectives:**

<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
1. Examine various types of end effectors used in robotic applications.	1.1 Discuss the types of movements an end effector can perform. 1.2 Describe the types of end effector grippers. 1.3 Identify the benefits of end effector grippers. 1.4 List important factors and desirable characteristics to be considered in the selection of grippers for different applications. 1.5 Investigate the use and application of vacuum grippers. 1.6 Investigate the use and application of parallel grippers. 1.7 Investigate the use and application of servo grippers. 1.8 Examine dress package requirements and cable management used in robot applications. 1.9 Identify different end effector tools and their applications. 1.10 Describe the common types of end effector tools and their Applications. 1.11 List important factors and desirable characteristics to be considered in the design of end effector tools. 1.12 Identify different end effector Tools and their applications. 1.13 Describe what non-prehensile is in relation to end effector tools. 1.14 State examples of robot end effector tools used in automated industries. 1.15 List the advantages of end effector tools. 1.16 List the disadvantages of end effector tools.
<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
2. Examine various types of end effector changers used in robotic applications.	2.1 Identify different end effector tool changers and their applications. 2.2 Identify the benefits of changeable end effectors. 2.3 List important factors and desirable characteristics to be considered in the design of end effector tool changers. 2.4 State examples of robot end effector tool changers used in automated industries.



	2.5 List the advantages of end effector tool changers. 2.6 List the disadvantages of end effector tools changers.
<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
3. Examine various types of sensors and their applications.	3.1 Investigate different sensor types used in automation. 3.2 Compare and contrast different sensors (photoelectric, diffuse, ultrasonic, etc...).
<b>Course Outcome 4</b>	<b>Learning Objectives for Course Outcome 4</b>
4. Examine the use of actuators, solenoids and encoders in industrial applications.	4.1 Illustrate different types of encoders (incremental, absolute). 4.2 Investigate how encoders are used for tracking parts in automation cells. 4.3 Examine robot tracking software and how it uses encoders. 4.4 Investigate how actuators are used in automation cells. 4.5 Investigate how solenoids are used in peripheral devices.
<b>Course Outcome 5</b>	<b>Learning Objectives for Course Outcome 5</b>
5. Examine various safety devices and their peripheral integration in automation cells.	5.1 Examine different safety devices such as light curtains, area scanners and emergency stop interfaces. 5.2 Identify applications of safety devices. 5.3 Examine different safety Fieldbus protocols used in industry.

**Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Assignments and Lab Activity	40%
Written Test 1	30%
Written Test 2	30%

**Date:** August 28, 2019

**Addendum:** Please refer to the course outline addendum on the Learning Management System for further information.

