COURSE OUTLINE: RAA110 - ROBOT PROGRAMMING I

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Course Code: Title	RAA110: ROBOT PROGRAMMING I
Program Number: Name	4073: ROBOTICS & AUTOMATIO
Department:	ROBOTICS GRADUATE CERTIFICATE
Semesters/Terms:	20F
Course Description:	The objective of this course is to introduce students to industrial robots used in manufacturing facilities. The emphasis will be on proper safety practices when using robots in our labs as well as in industry. The students will familiarize themselves with our ABB robots as well as the teach pendant and controller in order to safely manipulate it during laboratory exercises. The students will be introduced to ABB Robot Studio as well as the file structure used to create programs on the robot controller
Total Credits:	5
Hours/Week:	5
Total Hours:	75
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
This course is a pre-requisite for:	RAA201, RAA204, RAA210
Vocational Learning Outcomes (VLO's) addressed in this course: **Please refer to program web page for a complete listing of program outcomes where applicable.**	**4073 - ROBOTICS & AUTOMATIO** VLO 1 Construct and evaluate robotic control programs for various scenarios against which to model the functionality and stability of automation systems. VLO 2 Plan and lead the installation of new industrial equipment and its physical and digital integration with existing systems. VLO 3 Collaborate with health and safety personnel to develop plans and specifications that incorporate, among other elements, safety controls and physical guarding to comply with all applicable regulatory safety designs and standards used in industrial robotic applications. VLO 7 Formulate and use a variety of troubleshooting techniques on new and legacy electromechanical equipment, processes, systems and subsystems.
Essential Employability Skills (EES) addressed in this course:	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.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.

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	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.
Course Evaluation:	
Other Course Evaluation & Assessment Requirements:	Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% 4.00 B 70 - 79% 3.00 C 60 - 69% 2.00 D (Fail)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. Students must pass both the theory portion and the lab portion of the course including the practical test to receive a passing grade in the course. 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.
Books and Required Resources:	Industrial Robotics Fundamentals by Larry T. Ross Publisher: Goodheart-Willcox Edition: Third ISBN: 978-1-63126-941-07
Course Outcomes and Learning Objectives:	

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Illustrate safe practices in our lab environment as well as in typical manufacturing environments	1.1 Explain the different safety practices that should be implemented in robotic cells 1.2 Investigate safety devices used in our lab 1.3 Examine case studies of proper and improper robotic implementations as it pertains to safety
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Examine typical robotic applications used in various manufacturing environments	2.1 List types of robotic applications (palletizing, welding, painting, material handling, etc.) 2.2 Examine types of end effectors used in different robot applications

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		2.3 Identify different parts of robot hardware and software
	Course Outcome 3	**Learning Objectives for Course Outcome 3**
	3. Explain basics of robot hardware and software	3.1 List steps to enable robot motion 3.2 Understand the right-hand rule and Cartesian coordinate system 3.3 List different types of robot motion and termination types
	Course Outcome 4	**Learning Objectives for Course Outcome 4**
	4. Operate ABB Flex-pendant and Robot Studio	4.1 Examine programming structure used in Rapid 4.2 List file structure of ABB robots 4.3 Examine Flex-pendant sub-menus 4.4 Examine Robot Studio sub-menus 4.5 Open and connect to robot through Robot Studio 4.6 Create, save, backup, etc., a new program using pendant
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	5. Create a robot program to perform a task	5.1 Practice programming ABB robot using the Flex-pendant and Robot Studio to do simple tasks 5.2 Applying prior knowledge to create a program and download to robot and run program. 5.3 Introduce concepts surrounding how TCP and Base frames are used in programming

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	10%
Attendance & Participation	10%
Labs	40%
Practical Test	20%
Test 1	10%
Test 2	10%

Date: June 11, 2020

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

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