COURSE OUTLINE: RAA210 - ROBOT PROGRAMMING II

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Course Code: Title	RAA210: ROBOT PROGRAMMING II
Program Number: Name	4073: ROBOTICS & AUTOMATIO
Department:	ROBOTICS GRADUATE CERTIFICATE
Academic Year:	2022-2023
Course Description:	The objective of this course is to continue the study of programming ABB robots and to investigate advanced topics such as the use of tool centre points (TCP), base frames, advanced file handling and application programming.
Total Credits:	5
Hours/Week:	5
Total Hours:	75
Prerequisites:	RAA106, RAA110
Corequisites:	There are no co-requisites for this course.
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 5 Validate and optimize the functioning of motor, drive, control, and robotic systems. 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. 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:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
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 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.

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Investigate TCPs and how they are used in application programming	1.1 Interpret why TCPs are used in robot applications 1.2 Explain how to teach a TCP using FlexPendant 1.3 Demonstrate implementation of TCP in a robot program
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Investigate base frames and how they are used in application programming	2.1 Interpret why base frames and work objects are used in robot applications 2.2 Explain how to teach a base frame and using FlexPendant 2.3 Demonstrate TCP and base frames in robot motion
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Investigate interrupts and trap routines	3.1 Investigate asynchronous scenarios where interrupts are needed 3.2 Examine how trap routines are used in Rapid programming 3.3 Demonstrate how to use an interrupt in a robot program
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Investigate the use of	4.1 Examine why searches are used in robot applications

	other Advanced functions	4.2 Demonstrate how to use a search in a robot program 4.3 Examine World zones
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	5. Investigate advanced system and file handling	5.1 Illustrate system backup and restore procedures 5.2 Examine how to reload a new system onto an ABB controller 5.3 Illustrate file structure of ABB controller

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Assignments	10%
Attendance & Participation	10%
Labs	40%
Practical Exam	20%
Written Exam	20%

Date: August 15, 2022

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