COURSE OUTLINE: ELR216 - INTRO TO ROBOTICS

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Course Code: Title	ELR216: INTRODUCTION TO ROBOTICS
Program Number: Name	4026: ELECTRICAL TN-PROC 4029: ELECTRICAL TY-PROCES 4127: ELECTRICAL TN-TRADES
Department:	ELECT./INSTRUMENTATION PS
Semesters/Terms:	18F
Course Description:	This is an introductory course in industrial robotics fundamentals. Topics covered will include types of robots and their applications, cell design, safety and utilization of simulation/programming software. This course covers robotics and industrial automation fundamentals, including system configurations, applications, methods of power transmission, types of control, tooling and interfacing with peripherals. If time permits Students will develop and demonstrate basic programs for control of 6 axis robots developed in ABB RoboStudio Simulation program.
Total Credits:	2
Hours/Week:	2
Total Hours:	30
Prerequisites:	ELN210
Corequisites:	ELR232
Vocational Learning Outcomes (VLO's) addressed in this course: Please refer to program web page for a complete listing of program outcomes where applicable.	**4029 - ELECTRICAL TY-PROCES** VLO 1 Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics. VLO 8 Use computer skills and tools to solve a range of electrical related problems. VLO 12 Apply and monitor health and safety standards and best practices to workplaces. VLO 13 Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles. VLO 16 Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.
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 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 8 Show respect for the diverse opinions, values, belief systems, and contributions of

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others.

	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%
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.

Books and Required Resources:

Industrial Robotics Fundamentals by Larry Ross, Stephen Fardo, Michael Walach
Publisher: G-W
ISBN: 978-1-63126-941-7

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Understand various Basic Terminology, Concepts of a robots	1.1 Describe early robots and their role. 1.2 State the important developments in the evolution of robots 1.3 List and explain the classifications of Industrial Robots 1.4 Define two types of automation 1.5 Discuss the role of robots in the workforce
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Understand the fundamentals of a robots and related equipment and their industrial applications.	2.1 Identify the five major parts of a robot 2.2 Explain degrees of freedom as applied to robots. 2.3 Classify robots according to type of control systems and type of actuator drives 2.4 Discuss the four basic configurations for robots 2.5 Describe how robots are integrated into manufacturing process 2.6 Discuss factors to consider in selecting the proper robot for a given task. 2.7 Identify applications where robots are used in industry i 2.8 Discuss the types of movements an end effector can perform 2.9 Describe the types of end effector grippers and end effector tools 2.10 Identify the benefits of changeable end effectors 2.11 List important factors and desirable characteristics to be

		considered in the design of end effectors
	Course Outcome 3	**Learning Objectives for Course Outcome 3**
	3. Understand the fundamentals of a robots and related equipment safety	3.1 Discuss general safety practices for the student lab and work area. 3.2 Discuss safety practices related to robots and related equipment. 3.3 Describe guidelines, barriers, sensors, and overload protection for robotic safety as related to industry and the student lab environment.
	Course Outcome 4	**Learning Objectives for Course Outcome 4**
	4. Understand the fundamentals of a robots Programming	4.1 Discuss the three generations in the evolution of programming for robots. 4.2 Identify classifications of robots according to the pattern of motion they use 4.3 List the fore programming methods for robots 4.4 Describe the use of high level programming languages for robots 4.5 Discuss the differences between hierarchical control and task level programming 4.6 Describe how voice recognition systems can be used with robots 4.7 Discuss ABB RobotStudio Software as it applies to programming the Lab robots
	Course Outcome 5	**Learning Objectives for Course Outcome 5**
	5. Understand the fundamentals of a robots Electromechanical systems	5.1 Explain how sensing, timing, and control systems are used in the operation of robots. 5.2 Discuss rotary motion systems used for robotics 5.3 Describe the characteristics of hydraulic and pneumatic systems 5.4 Discuss the characteristics of fluid flow. 5.5 Discuss uses for hybrid power systems
	Course Outcome 6	**Learning Objectives for Course Outcome 6**
	6. Understand the fundamentals of maintaining a robots system	6.1 Describe successful troubleshooting methods for robotic systems 6.2 Follow the proper techniques for general servicing of equipment 6.3 List the steps in developing a preventive maintenance plan

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight	Course Outcome Assessed
Assignment 1	10%	
Assignment 2	10%	
Attendance	5%	
Test 1	30%	
Test 2	30%	
Test 3	15%	

Date: August 22, 2018

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