



# COURSE OUTLINE

## ELR216

Prepared: Ron Chartrand    Approved: Corey Meunier

<b>Course Code: Title</b>	ELR216: INTRODUCTION TO ROBOTICS
<b>Program Number: Name</b>	4029: ELECTRICAL TY-PROCES
<b>Department:</b>	ELECT./INSTRUMENTATION PS
<b>Semester/Term:</b>	17F
<b>Course Description:</b>	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.
<b>Total Credits:</b>	2
<b>Hours/Week:</b>	2
<b>Total Hours:</b>	30
<b>Prerequisites:</b>	ELN210
<b>Corequisites:</b>	ELR232
<b>Vocational Learning Outcomes (VLO's):</b>  Please refer to program web page for a complete listing of program outcomes where applicable.	<p>#1. Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics.</p> <p>#8. Use computer skills and tools to solve a range of electrical related problems.</p> <p>#12. Apply and monitor health and safety standards and best practices to workplaces.</p> <p>#13. Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.</p> <p>#16. Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.</p>
<b>Essential Employability Skills (EES):</b>	<p>#1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>#2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>#4. Apply a systematic approach to solve problems.</p> <p>#5. Use a variety of thinking skills to anticipate and solve problems.</p>



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- #6. Locate, select, organize, and document information using appropriate technology and information systems.
- #7. Analyze, evaluate, and apply relevant information from a variety of sources.
- #8. Show respect for the diverse opinions, values, belief systems, and contributions of others.
- #9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.
- #10. Manage the use of time and other resources to complete projects.
- #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.

### Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
assignment 1	10%
assignment 2	10%
Test 1	25%
Test 2	25%
Test 3	30%

### Books and Required Resources:

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



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### Course Outcomes and Learning Objectives:

#### Course Outcome 1.

Understand various Basic Terminology, Concepts of a robots

#### Learning Objectives 1.

Describe early robots and their role.  
State the important developments in the evolution of robots  
List and explain the classifications of Industrial Robots  
Define two types of automation  
Discuss the role of robots in the workforce

#### Course Outcome 2.

Understand the fundamentals of a robots and related equipment and their industrial applications.

#### Learning Objectives 2.

Identify the five major parts of a robot  
Explain degrees of freedom as applied to robots.  
Classify robots according to type of control systems and type of actuator drives  
Discuss the four basic configurations for robots  
Describe how robots are integrated into manufacturing process  
Discuss factors to consider in selecting the proper robot for a given task.  
Identify applications where robots are used in industry i  
Discuss the types of movements an end effector can perform  
Describe the types of end effector grippers and end effector tools  
Identify the benefits of changeable end effectors  
List important factors and desirable characteristics to be considered in the design of end effectors

#### Course Outcome 3.



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Understand the fundamentals of a robots and related equipment safety

### **Learning Objectives 3.**

Discuss general safety practices for the student lab and work area.

Discuss safety practices related to robots and related equipment.

Describe guidelines, barriers, sensors, and overload protection for robotic safety as related to industry and the student lab environment.

### **Course Outcome 4.**

Understand the fundamentals of a robots Programming

### **Learning Objectives 4.**

Discuss the three generations in the evolution of programming for robots.

Identify classifications of robots according to the pattern of motion they use

List the fore programming methods for robots

Describe the use of high level programming languages for robots

Discuss the differences between hierarchical control and task level programming

Describe how voice recognition systems can be used with robots

Discuss ABB RobotStudio Software as it applies to programming the Lab robots

### **Course Outcome 5.**

Understand the fundamentals of a robots Electromechanical systems

### **Learning Objectives 5.**

Explain how sensing, timing, and control systems are used in the operation of robots.

Discuss rotary motion systems used for robotics

Describe the characteristics of hydraulic and pneumatic systems

Discuss the characteristics of fluid flow.

Discuss uses for hybrid power systems



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### **Course Outcome 6.**

Understand the fundamentals of maintaining a robots system

### **Learning Objectives 6.**

Describe successful troubleshooting methods for robotic systems  
Follow the proper techniques for general servicing of equipment  
List the steps in developing a preventive maintenance plan

**Date:**

Friday, September 1, 2017

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