



# COURSE OUTLINE

## ELR325

Prepared: Ron Chartrand    Approved: Corey Meunier

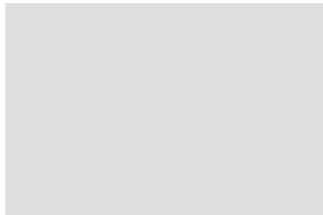
<b>Course Code: Title</b>	ELR325: TELECOMMUNICATION SYSTEMS II
<b>Program Number: Name</b>	4029: ELECTRICAL TY-PROCES
<b>Department:</b>	ELECT./INSTRUMENTATION PS
<b>Semester/Term:</b>	17F
<b>Course Description:</b>	The Fundamentals of Industrial Networks as presented in this course is for those who need a basic working knowledge and an overview of today's data communications industrial networking systems and networking technologies. The objective of this course is to outline the best practice in designing, installing, commissioning and troubleshooting industrial Networks. In any given plant, factory or installation, there are a number of different industrial networks and communications standards use and the key to successful implementation is the degree to which the entire system integrates and works together. This course will focus on introducing common Allen Bradley automation networks such as Data Hwy. Ethernet I/P ControlNet, Devicenet and other commonly used industrial networks such as Profibus, Modbus, and other industrial EtherNet etc.as time permits.
<b>Total Credits:</b>	4
<b>Hours/Week:</b>	4
<b>Total Hours:</b>	60
<b>Prerequisites:</b>	ELR223, ELR251
<b>Corequisites:</b>	ELR320
<b>This course is a pre-requisite for:</b>	ELR315
<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>#2. Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.</p> <p>#4. Design, assemble, test, modify, maintain and commission electrical equipment and systems to fulfill requirements and specifications under the supervision of a qualified person.</p> <p>#8. Use computer skills and tools to solve a range of electrical related problems.</p> <p>#10. Prepare reports and maintain records and documentation systems.</p> <p>#11. Design, install, test, commission and troubleshoot telecommunication systems under the</p>



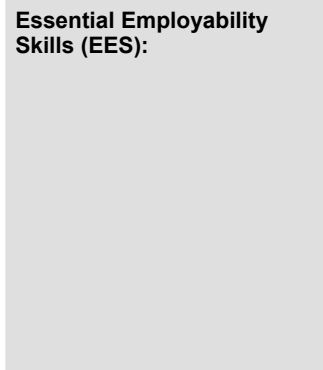
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supervision of a qualified person.  
 #12. Apply and monitor health and safety standards and best practices to workplaces.  
 #13. Perform and monitor tasks in accordance with relevant legislation, policies, procedures, standards, regulations, and ethical principles.  
 #14. Configure installation and apply electrical cabling requirements and system grounding and bonding requirements for a variety of applications under the supervision of a qualified person.  
 #17. Apply project management principles to contribute to the planning, implementation, and evaluation of projects.



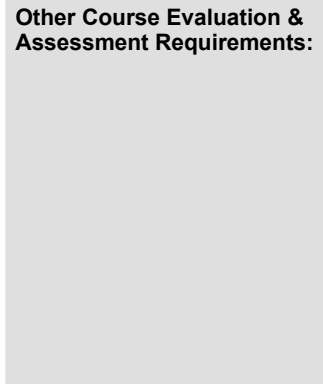
**Essential Employability Skills (EES):**

#1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.  
 #2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.  
 #4. Apply a systematic approach to solve problems.  
 #5. Use a variety of thinking skills to anticipate and solve problems.  
 #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:**

Passing Grade: 50%, D



**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.



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W Student has withdrawn from the course without academic penalty.

### Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Attendance	15%
Lab Demonstration	15%
Lab Write-ups	15%
Test 1	10%
Test 2	20%
Test 3	25%

### Books and Required Resources:

Practical Industrial Data Communication Best Practice Techniques by Deon Reynder, Steve Mackay, Edwin Wright  
Publisher: ELSEVIER  
ISBN: 0 7506 6395 2

### Course Outcomes and Learning Objectives:

#### Course Outcome 1.

Understand various Basic Terminology, Concepts of a Computer Network and related networking certifications.

#### Learning Objectives 1.

- List the advantages of industrial networked computing relative to islands of automation
- Identify the elements of an industrial network
- Explain Basic Industrial Network Terminology and Concepts
- Describe several specific uses for Industrial networks
- Identify some of the certifications available to industrial networking professionals
- Identify the kinds of non-technical, or soft, skills that will help you succeed as an industrial networking professional
- Identify and Distinguish between different Data communications standards such as, RS-232 interface standard, RS-485 interface standard
- Understand the importance of the ISO OSI model and how it applies to the Industrial Networks discussed in this course



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### **Course Outcome 2.**

Analyze and Discuss the operation of Industrial Ethernet Network systems

### **Learning Objectives 2.**

Understand the basics of Industrial EtherNet

State the application advantages and limitations of Industrial Ethernet in today's modern industries

Understand the role of TCP/IP and its associate protocols have in the Industrial Ethernet plant application

Describe how industrial Ethernet systems operate

Compare wired to wireless industrial networking

List the Advantages and Disadvantages of Wireless technology

List and Describe Communication medias used in Industrial Networking systems discussed in this course

Identify Industrial Ethernet Network cable types and uses

Identify Industrial Ethernet Network troubleshooting

Describe the terms Electrical Coupling Grounding and Shielding as they applies to Industrial

### **Course Outcome 3.**

Analyze and Discuss the operation of ControlNet Network systems.

### **Learning Objectives 3.**

Understand and Identify ControlNet Applications and place in in a typical plant Hierarchy

Identify Frame Format and Network Characteristics

Understand ControlNet Configuration and Network Components

Explain ControlNet Addressing and Topology

Discuss Installation ,commissioning and troubleshooting

Identify the Types & Media characteristics

Identify the core protocols of each protocol suite and its functions

### **Course Outcome 4.**



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Analyze and Discuss the operation of DeviceNet Network systems.

### **Learning Objectives 4.**

Understand and Identify Devicenet Applications and place in in a typical plant Hierarchy  
Identify Frame Format and Network Characteristics  
Understand DeviceNet Configuration and Network Components  
Explain DeviceNet Addressing and Topology  
Discuss Installation ,commissioning and troubleshooting  
Identify the Types & Media characteristics

### **Course Outcome 5.**

Analyze and Discuss the operation of Profibus Network systems.

### **Learning Objectives 5.**

Understand and Identify different types of Profibus networks and their Applications and place in in a typical plant Hierarchy  
Identify Frame Format and Network Characteristics  
Understand Profibus networks Configuration and Network Components  
Explain Profibus Networks Addressing and Topology  
Discuss Installation ,commissioning and troubleshooting  
Identify the Types & Media characteristics

### **Course Outcome 6.**

Understand the basics of common Industrial Networks

### **Learning Objectives 6.**

Identify different Industrial Networks such as Modbus, ASI, and Hart etc.  
Identify basic Industrial Networks addressing methods  
Understanding the differences between industrial network types  
Discuss Installation ,commissioning and troubleshooting  
Identify the Types & Media characteristics



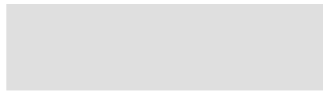
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Demonstrate the ability to communicate peer to peer information from two or more industrial computerized lab equipment over several AB industrial networks such as Ethernet I/P, ControlNet, Devicenet, Data Hwy.

**Date:**

Friday, September 1, 2017



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