



Western Technical College

## 10620141 Industrial Networking

### Course Outcome Summary

#### Course Information

<b>Description</b>	In the Industrial Networking course students will be introduced to many different Industrial networks. The course will start with basic analog control, and the physical layer issues and methodologies for their proper installation. We then move on to low level remote I/O networks, their structure and physical makeup. The class will then advance to higher level networks such as DeviceNet, Profibus and ControlNet. These networks make up the communication backbones of most industrial equipment. Finally we explore EtherNet/IP, the future of Industrial networking. During this course we will utilize these networks to communicate between discrete and analog I/O devices, PLCs, Remote devices, Servo Drives, VFDs, and Touchscreens utilizing Rockwell Automation software.
<b>Career Cluster</b>	Manufacturing
<b>Instructional Level</b>	Associate Degree Courses
<b>Total Credits</b>	2
<b>Total Hours</b>	54

#### Textbooks

No textbook required.

#### Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Scientific calculator (recommend T1-36x Solar). **Vendor:** Campus Shop. Required.

#### Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience

5. Live Responsibly: Foster Accountability
6. Refine Professionalism: Act Ethically
7. Refine Professionalism: Improve Critical Thinking
8. Refine Professionalism: Participate Collaboratively
9. Refine Professionalism: Practice Effective Communication

## **Program Outcomes**

1. Perform work safely.
2. Troubleshoot electrical and mechanical systems and devices.
3. Repair electrical and mechanical systems.
4. Communicate technical information.
5. Integrate electrical and mechanical systems and devices.

## **Course Competencies**

### **1. Identify PC components.**

#### **Assessment Strategies**

- 1.1. Written Objective Test

#### **Criteria**

*You will know you are successful when:*

- 1.1. You identify the function and specifications of a CPU (Central Processor Unit).
- 1.2. You identify the function and specifications of a motherboard.
- 1.3. You identify the function and specifications of data storage devices.
- 1.4. You identify the function and specifications of RAM (Random Access Memory).
- 1.5. You identify the function and specifications of computer power supply

#### **Learning Objectives**

- 1.a. Examine the function and specifications of a CPU (Central Processor Unit).
- 1.b. Examine the function and specifications of a motherboard.
- 1.c. Examine the function and specifications of data storage devices.
- 1.d. Examine the function and specifications of RAM (Random Access Memory).
- 1.e. Examine the function and specifications of computer power supply

### **2. Manage PC hardware.**

#### **Assessment Strategies**

- 2.1. Demonstration

#### **Criteria**

*You will know you are successful when:*

- 2.1. You remove and install a CPU.
- 2.2. You remove and install a motherboard
- 2.3. You remove and install a data storage device.
- 2.4. You remove and install RAM.
- 2.5. You remove and install a power supply.

#### **Learning Objectives**

- 2.a. Practice removing and installing a CPU.
- 2.b. Practice removing and installing a motherboard
- 2.c. Practice removing and installing a data storage device.
- 2.d. Practice removing and installing RAM.
- 2.e. Practice removing and installing a power supply.

### **3. Manage PC software.**

#### **Assessment Strategies**

- 3.1. Demonstration

#### **Criteria**

*You will know you are successful when:*

- 3.1. You upgrade an operating system.
- 3.2. you perform a clean install of an operating system.
- 3.3. You install device drivers.
- 3.4. You update device drivers.
- 3.5. You install vendor specific PC software.

#### **Learning Objectives**

- 3.a. Demonstrate how to upgrade an operating system.
- 3.b. Practice a clean install of an operating system.
- 3.c. Practice installing device drivers.
- 3.d. Update device drivers.
- 3.e. Practice installing vendor specific PC software.

### **4. Explore serial network interface.**

#### **Assessment Strategies**

- 4.1. Demonstration

#### **Criteria**

*You will know you are successful when:*

- 4.1. You configure a computer for RS-232.
- 4.2. You configure an industrial device for RS-232
- 4.3. You build a RS-232 cable.
- 4.4. You test a RS-232 cable.
- 4.5. You describe the operation of RS-232 communication.

#### **Learning Objectives**

- 4.a. Examine the operation of RS-232 communication.
- 4.b. Configure a computer for RS-232.
- 4.c. Configure an industrial device for RS-232
- 4.d. Build a RS-232 cable.
- 4.e. Test a RS-232 cable.

### **5. Build serial network system.**

#### **Assessment Strategies**

- 5.1. Written Objective Test
- 5.2. Demonstration

#### **Criteria**

*You will know you are successful when:*

- 5.1. You identify the industrial device's serial networking configuration requirements.
- 5.2. You identify the industrial device's serial networking hardware requirements.
- 5.3. You establish communication between two serial devices.
- 5.4. You troubleshoot serial communication issues.

#### **Learning Objectives**

- 5.a. Explore the industrial device's serial networking configuration requirements.
- 5.b. Explore the industrial device's serial networking hardware requirements.
- 5.c. Determine how to establish communication between two serial devices.
- 5.d. Identify how to troubleshoot serial communication issues.

### **6. Explore proprietary industrial network systems.**

#### **Assessment Strategies**

6.1. Written Objective Test

**Criteria**

*You will know you are successful when:*

- 6.1. You describe the function of a Device Net network components.
- 6.2. You explain the parameters of a Device Net network.
- 6.3. You describe the function of a CAN (Controller Area Network) network.
- 6.4. You describe the function of a MODBUS network.

**Learning Objectives**

- 6.a. Explore the function of a Device Net network components.
- 6.b. Examine the parameters of a Device Net network.
- 6.c. Explore the function of a CAN (Controller Area Network) network.
- 6.d. Examine the function of a MODBUS network.

**7. Build proprietary industrial network systems.**

**Assessment Strategies**

- 7.1. Demonstration

**Criteria**

*You will know you are successful when:*

- 7.1. You calculate the data transfer speed of a Device Net network.
- 7.2. You calculate the power consumption of a Device Net network.
- 7.3. You design a Device Net network.
- 7.4. You document your design of a Device Net network.

**Learning Objectives**

- 7.a. Calculate the data transfer speed of a Device Net network.
- 7.b. Calculate the power consumption of a Device Net network.
- 7.c. Design a Device Net network.
- 7.d. Determine how to document your design of a Device Net network.

**8. Examine Ethernet IP industrial network systems.**

**Assessment Strategies**

- 8.1. Written Objective Test

**Criteria**

*You will know you are successful when:*

- 8.1. You explain the TCP/IP addressing system.
- 8.2. you explain the function of the DHCP ( Dynamic Host Configuration Protocol)
- 8.3. You explain the function of a DNS server
- 8.4. You explain the function of the Gateway address.
- 8.5. You explain the function of the Sub Net Mask.
- 8.6. You explain the differences between a static IP address and a Dynamic IP address.

**Learning Objectives**

- 8.a. Discuss the TCP/IP addressing system.
- 8.b. Identify the function of the DHCP ( Dynamic Host Configuration Protocol)
- 8.c. Explore the function of a DNS server
- 8.d. Explore the function of the Gateway address.
- 8.e. Explore the function of the Sub Net Mask.
- 8.f. Discuss the differences between a static IP address and a Dynamic IP address.

**9. Build ethernet IP industrial network systems.**

**Assessment Strategies**

- 9.1. Demonstration

**Criteria**

*You will know you are successful when:*

- 9.1. You configure a device with a static IP address.
- 9.2. You configure a device's DNS server address.
- 9.3. You configure a device's Gateway Address.
- 9.4. You configure a device's subnet mask.
- 9.5. You establish network communications.
- 9.6. You troubleshoot network configuration issues.

**Learning Objectives**

- 9.a. Practice configuring a device with a static IP address.
- 9.b. Practice configuring a device's DNS server address.
- 9.c. Practice configuring a device's Gateway Address.
- 9.d. Practice configuring a device's subnet mask.
- 9.e. Determine how to establish network communications.
- 9.f. Examine how to troubleshoot network configuration issues.

**10. Explore different network models.**

**Assessment Strategies**

- 10.1. Written Objective Test

**Criteria**

*You will know you are successful when*

- 10.1. You describe the function of each layer of the OSI model.
- 10.2. You apply the OSI model in network troubleshooting.
- 10.3. You differentiate between the OSI model and the TCP/IP model layers for function.

**Learning Objectives**

- 10.a. Examine the 7 layer network OSI model.
- 10.b. Discuss the function of each layer of the OSI model.
- 10.c. Determine how to apply the OSI model in network troubleshooting.
- 10.d. Examine the 4 Layer TCP/IP network model.
- 10.e. Compare the OSI model and the TCP/IP model layers for function.

**11. Explore router configurations.**

**Assessment Strategies**

- 11.1. Demonstration

**Criteria**

*You will know you are successful when*

- 11.1. You configure router IP address.
- 11.2. You configure router DHCP server.
- 11.3. You configure router firewall.
- 11.4. You configure router Wi-fi network channel.
- 11.5. You configure router Wi-fi security.
- 11.6. You update the router software.
- 11.7. You reset the router to a default configuration.

**Learning Objectives**

- 11.a. Practice configuring router IP address.
- 11.b. Practice configuring router DHCP server.
- 11.c. Practice configuring router firewall.
- 11.d. Practice configuring router Wi-fi network channel.
- 11.e. Practice configuring router Wi-fi security.
- 11.f. Identify how to update the router software.
- 11.g. Determine how to reset the router to a default configuration.