Snead State Community College
Workforce Development

Self-Pace Online Training
Students will have six weeks to complete

$100.00 per person

INTRODUCTION TO INDUSTRY 4.0 LEVEL I

This introductory Level I course introduces the student to the basic concepts related to next generation industry practices, known as Industry 4.0. Included in the course is an introduction to manufacturing processes, safety responsibilities, industrial lean production concepts, and Internet of Things.

* **Introduction to Advanced Manufacturing**
* **Technology and Advanced Manufacturing**
* **Principles of Manufacturing Processes**
* **Basic Mechanical Elements**
* **Safety Responsibilities**
* **Machine Safety**
* **Types of PPE**
* **Equipment Safety**
* **Material Handling Safety**
* **Manufacturing Metrics**
* **Lean Production Concepts**
* **Industrial Internet of Things**
* **Multi-Station Mechatronic Communications**
* **Network Performance and Managed Ethernet Switch Operation**
* **Introduction to Electronic Sensors**
* **Smart Photoelectric Sensors**
* **Smart Pressure Sensors**
* **RFID Operation**
* **Basic VFD Operation**
* **Barcode System Operation**
* **Stepper Motor Indexing Systems**

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Introduction to Industry 4.0 Level I

This introductory level I course introduces the student to the basic concepts related to next generation industry practices, known as Industry 4.0. Included in the course is an introduction to manufacturing processes, safety responsibilities, industrial lean production concepts and Internet of Things.

Outline

1. Introduction the Advanced Manufacturing
   - Objective 1 - Define Manufacturing and Identify Types of Manufactured Products
   - Objective 2 - Define Advanced Manufacturing and Identify Three Examples
   - Objective 3 - Describe the Role of Product Design in Advanced Manufacturing
   - Self Review 1
2. Technology and Advanced Manufacturing
   - Objective 1 - Describe the Impact of Computers on Advanced Manufacturing
   - Objective 2 - Describe the Benefits of Factory Automation
   - Objective 3 - Describe the Function of a CNC Machine
   - Objective 4 - Identify Two Types of Robots
   - Objective 5 - Describe the Function of a PLC
   - Objective 6 - Explain the Use of Software in Advanced Manufacturing
   - Objective 7 - Describe the Use of New Technologies in Advanced Manufacturing
   - Self Review 1
3. Principles of Manufacturing Processes
   - Objective 1 - Describe Types of Assembly
   - Objective 2 - Describe Types of Metal Separation Processes
   - Objective 3 - Describe Types of Forming Processes
   - Objective 4 - Describe Types of Heat Treating Processes
   - Objective 5 - Describe Types of Finishing Processes
   - Objective 6 - Describe Types of Automated Material Handling Processes
   - Objective 7 - Describe Types of Inspection Processes
   - Objective 8 - Describe Types of Material Storage Methods
   - Self Review 1
4. Basic Mechanical Elements
   - Objective 1 - Describe Three Types of Basic Mechanisms
   - Objective 2 - Describe Three Types of Levers
   - Skill 1 - Operate a First-Class Lever
   - Objective 3 - Define Torque and Give Its Units of Measurement
   - Objective 4 - Define Mechanical Advantage
   - Skill 2 - Measure the Mechanical Advantage of a First-Class Lever
   - Objective 5 - Define Rotary Mechanical Power
   - Self Review 1
5. Safety Responsibilities
   - Objective 1 - Define Workplace Health and Safety and Explain Its Importance

Objective 2 - Describe the Importance of Safety Policies
Objective 3 - Describe the Results of Unsafe Behavior
Objective 4 - Describe the Purpose of the Occupational Safety and Health Administration
Objective 5 - Describe the Purpose of the Environmental Protection Agency
Objective 6 - Describe the Purpose of NIOSH, EPCRA, and State Safety Agencies
Objective 7 - Describe the Safety Responsibilities within a Company
Objective 8 - Describe How to Locate Safety Regulations and Policies
Self Review 1

6. Machine Safety
   - Objective 1 - Describe Clothing Safety Guidelines for Machine Operators
   - Objective 2 - Describe the Machine Operation Safety Guidelines
   - Objective 3 - Describe the Types of Machine Guards
   - Objective 4 - Describe the Operation of Machine Interlocks
   - Objective 5 - Describe the Operation of Emergency Stop Controls
   - Objective 6 - Describe the Function of a Lockout/Tagout System
   - Objective 7 - Describe How to Perform an Electrical Lockout/Tagout
   - Self Review 1
7. Types of PPE
   - Objective 1 - Describe the Types of Head PPE
   - Objective 2 - Describe the Types of Eye PPE
   - Objective 3 - Describe the Types of Ear PPE
   - Objective 4 - Describe the Types of Hand and Arm PPE
   - Objective 5 - Describe the Types of Foot PPE
   - Objective 6 - Describe the Types of Respiratory PPE
   - Objective 7 - Describe the Types of Body PPE
   - Self Review 1
8. Equipment Safety
   - Objective 1 - Describe Types of Hand Tools and Power Tools
   - Objective 2 - Describe the Hand Tool Safety Guidelines
   - Objective 3 - Describe the Portable Power Tool Safety Guidelines
   - Objective 4 - Describe Compressed Gas Safety Guidelines
   - Self Review 1
9. Material Handling Safety
   - Objective 1 - Describe Types of Manual Material Handling Equipment
   - Objective 2 - Describe Basic Safety Rules for Hoist and Crane Use
   - Objective 3 - Describe Basic Safety Rules for Forklift Use
   - Self Review 1
10. Manufacturing Metrics
    - Objective 1 - Describe Five Critical Manufacturing Performance Objectives
    - Objective 2 - Define Performance Metrics and Key Process Indicators
    - Objective 3 - Define Productivity and List Its Measures
    - Objective 4 - Describe How to Calculate Machine/Employee Productivity
    - Objective 5 - Describe How to Calculate Production Efficiency
    - Objective 6 - Describe How to Calculate Machine Utilization
    - Objective 7 - Describe How to Calculate Value Added Per Employee
    - Self Review 1
11. Lean Production Concepts
    - Objective 1 - Define Lean Manufacturing
    - Objective 2 - Define Value-Added and Non-Value-Added Activities
    - Objective 3 - Describe the Eight Deadly Wastes
    - Objective 4 - Describe the Core Elements of Lean Manufacturing
    - Objective 5 - Define Lean Production (Just-In-Time)

17. Smart Pressure Sensors
    - Objective 1 - Describe the Function of a Smart Sensor
    - Objective 2 - Describe the Operation of a Smart Pressure Sensor
    - Objective 3 - Describe How to Configure an IOLink Master in a PLC Project
    - Skill 1 - Configure a Smart Pressure/Vacuum Sensor in a PLC Project
    - Objective 4 - Describe the Operation of a Smart Pressure Sensor in a PLC Project
    - Skill 2 - Operate a PLC Project That Uses a Smart Pressure/Vacuum Sensor
    - Skill 3 - Design a Smart Factory PLC Project That Uses a Smart Pressure/Vacuum Sensor
    - Self Review 1
18. RFID Operation
    - Objective 1 - Describe the Function of an RFID System
    - Objective 2 - Describe the Basic Operation of an RFID System
    - Objective 3 - Describe Factors That Affect RFID System Operation
    - Skill 1 - Operate an RFID System
    - Objective 4 - Describe the Operation of Rockwell Studio 5000 Message Instruction
    - Skill 2 - Enter and Operate a Rockwell Studio 5000 PLC Logic Program That Uses a Message Instruction
    - Self Review 1
19. Basic VFD Operation
    - Objective 1 - Describe the Function of an AC Variable Frequency Drive
    - Objective 2 - Describe the Basic Operation of an AC Variable Frequency Drive
    - Objective 3 - Describe the Main Parts of an AC Variable Frequency Drive
    - Objective 4 - Describe the Wiring Connections to an AC Variable Frequency Drive
    - Objective 5 - Describe the Keypad Menus of an AC Variable Frequency Drive
    - Objective 6 - Describe How to Use a Keypad to Operate an AC Variable Frequency Drive
    - Skill 1 - Use a Keypad to Operate an AC Variable Frequency Drive
    - Self Review 1
20. Barcode System Operation
    - Objective 1 - Describe the Function of a Barcode Identification System
    - Objective 2 - Describe the Operation of a Barcode Reader
    - Objective 3 - Describe How to Maximize Barcode Scan Accuracy
    - Objective 4 - Describe the Basic Operation of Serial Communication
    - Skill 1 - Operate a Barcode Reader
    - Objective 5 - Describe the Basic Operation of an Ethernet-to-Serial Interface Module
    - Objective 6 - Describe How to Configure and Test an Ethernet-to-Serial Interface Module
    - Skill 2 - Configure and Test an Ethernet-to-Serial Interface Module
    - Self Review 1
21. Stepper Motor Indexing Systems
    - Objective 1 - Describe the Operation of an Indexing Material Processing Station
    - Objective 2 - Describe the Operation of a Stepper Motor
    - Objective 3 - Describe the Operation of a Stepper Motor Control System
    - Objective 4 - Describe the Operation of a PLC-Controlled Stepper Motor System
    - Skill 1 - Operate a Stepper Motor Indexing System
    - Objective 5 - Describe How to Adjust a Thru-Beam Fork Sensor
    - Skill 2 - Adjust a Thru-Beam Fork Sensor
    - Objective 6 - Describe the Sequence of Operation of an Indexing Station
    - Skill 3 - Design a PLC Program That Sequences an Indexing Station
    - Self Review 1