

Snead State Community College Workforce Development



*Self-Pace Online Training
Students will have six weeks to complete
\$100.00 per student*

Introduction to Robotics & Computer Programming

Robotics and Computer Programming 1 discusses the basic operation of a Robot. These skills include safety, powerup, shutdown, manual operation, homing, end effector operation. Skills taught also include basic robot programming including movement and effector commands, interfacing and material handling, application development, flexible manufacturing cells, quality control, production control, and workcell development.

- * **Basic Robot Operation**
- * **Basic Robot Programming**
- * **Interfacing and Material Handling**
- * **Application Development**
- * **Flexible Manufacturing Cells**
- * **Quality Control**
- * **Production Control**

Register Here:
www.snead.edu/tbiregistration

For more information:

Cherri Barnard, 256.840.4152, cbarnard@snead.edu
Teresa Walker, 256.840.4211, twalker@snead.edu



Introduction to Robotics & Computer Programming

Robotics and Computer Programming 1 discusses the basic operation of a robot. These skills include safety, powerup, shutdown, manual operation, homing, end effector operation. Skills taught also include basic robot programming including movement and effector commands, interfacing and material handling, application development, flexible manufacturing cells, quality control, production control and work cell development.

Outline

1. Basic Robot Operation

Segment 1 - Power Up and Shutdown

Objective 1 - Define a Robot and Give an Application
Objective 2 - Describe Three Advantages of Robots
Objective 3 - Describe the Five Basic Robot Components
Activity 1 - Identification of Robot Components
Objective 4 - List Eight Rules of Robot Safety
Objective 5 - Describe the Operation of Five Types of Robot Safety Devices
Activity 2 - Pegasus Control Software Component Identification
Skill 1 - Power Up and Shut Down a Servo Robot
Self Review 1

Segment 2 - Manual Operation

Objective 6 - Describe Six Axes of a Robot Manipulator
Objective 7 - Describe Three Types of Jog Applications
Objective 8 - Describe the Function of a Robot Teach Pendant
Skill 2 - Jog a Servo Robot Using a Teach Pendant
Skill 3 - Jog a Servo Robot Using the Pegasus Control Software
Skill 4 - Adjust the Fast and Slow Jog Speed Settings
Self Review 2

Segment 3 - Homing

Objective 9 - Describe the Functions of the Four Components of a Servo Robot Axis
Activity 3 - Identification of Robot Axis Components
Objective 10 - Describe the Function of the Homing Procedure
Objective 11 - Describe the Operation of the Homing Procedure for a Servo Robot
Skill 5 - Home a Servo Robot
Self Review 3

Segment 4 - End Effector Operation

Objective 12 - Describe the Functions of Two Types of End Effectors
Objective 13 - List Two Types of Gripper Finger Designs and Describe Their Operation
Skill 6 - Manually Operate a Robot Gripper
Activity 4 - Robot Simulation Software Viewing Tools
Skill 7 - Move Parts Using the Manual Jog Function
Self Review 4

2. Basic Robot Programming

Segment 1 - Teaching Points

Objective 1 - Describe the Function and Operation of a Robot Program
Objective 2 - Describe How Position Points Are Recorded in a Robot's Memory
Skill 1 - Use a Teach Pendant to Teach Robot Position Points
Skill 2 - Test Teach Points
Skill 3 - Edit Teach Points
Self Review 1

Segment 2 - Basic Programming

Objective 3 - Describe the Function of Robot Programming Software and Give an Advantage
Skill 4 - Enter and Edit a Basic Robot Program
Objective 4 - Explain Four Ways to Stop a Servo Robot
Skill 5 - Run a Servo Robot Program
Skill 6 - Stop a Servo Robot Program
Self Review 2

Segment 3 - Movement and End Effector Commands

Objective 5 - Describe the Operation of a Move to Point Command
Objective 6 - Describe the Operation of a Robot Program
Skill 7 - Enter a Robot Program That Uses the Pmove Command
Objective 7 - Describe the Operation of the Program Commands: Grasp and Release
Skill 8 - Enter a Robot Program That Uses the Grasp and Release Commands
Skill 9 - Design a Robot Program to Perform a Basic Material Handling Task
Self Review 3

3. Interfacing and Material Handling

Segment 1 - Looping and Speed Commands

Objective 1 - Describe the Operation of the Commands: Label and Branch
Skill 1 - Enter a Robot Program That Uses the Label and Branch Commands
Objective 2 - Describe the Operation of the Program Commands: Speed and Delay
Skill 2 - Enter a Robot Program That Uses the Speed and Delay Commands
Skill 3 - Design a Robot Program That Uses Looping, Speed, and Delay Commands to Move an Object
Self Review 1

Segment 2 - I/O Interfacing

Objective 3 - Explain the Function of a Robot's Digital Inputs and Outputs
Skill 4 - Connect Digital Input and Output Devices to a Robot Controller
Objective 4 - Describe the Function of a Robot Operator Station
Skill 5 - Manually Test Discrete Inputs and Outputs
Objective 5 - Describe the Operation of the I/O Interface Commands: Waiti and Writeo
Skill 6 - Enter a Program That Has Waiti and Writeo Commands
Skill 7 - Design a Robot Program That Uses a Manual Operator Station
Self Review 2

Segment 3 - Material Handling

Objective 6 - Describe Three Applications of Robots in Material Handling
Objective 7 - Describe How Robots Are Applied to Plastics Injection Molding and List an Advantage
Skill 8 - Design a Robot Program That Will Unload an Automatic Machine
Self Review 3

4. Application Development

Segment 1 - CNC Machine Loading

Objective 1 - Describe Three Classifications of Robot Applications
Skill 1 - Connect a Solenoid-Operated Pneumatic Valve to the Output of the Robot Controller
Skill 2 - Connect a Robot Operator Station to the Robot Controller
Objective 2 - Describe How Robots Are Applied to CNC Machine Loading and Give an Advantage
Skill 3 - Design a Robot Program That Will Load and Unload an Automatic Machine
Self Review 1

Segment 2 - Robot Workcell Envelope

Objective 3 - Define the Work Envelope of a Robot

Objective 4 - Describe the Work Envelope of a Double-Jointed Robot and Give an Advantage
Skill 4 - Teach Points with a Double-Jointed Robot Arm Using the Full Range of Its Work Envelope
Skill 5 - Design a Robot Program That Uses a Robot's Double-Jointed Design
Objective 5 - Describe the Four Types of Robot Geometry and Give an Advantage of Each
Self Review 2

Segment 3 - Robot Application Development

Objective 6 - Describe Six Steps Used to Develop a Robot Program for a Given Application
Skill 6 - Design a Robot Program Given a General Description of the Application
Self Review 3

Segment 4 - Basic Conveyor Operation

Objective 7 - Define Material Transfer and Describe Five Methods
Objective 8 - Describe Three Conveyor Applications
Skill 7 - Connect and Configure a Servo Conveyor to a Servo Robot
Objective 9 - Describe Two Types of Conveyors and Give an Application of Each
Objective 10 - Describe the Operation of the External Motor Commands Mon and Moff
Skill 8 - Enter a Robot Program That Has Mon and Moff Commands
Skill 9 - Design a Robot Program That Uses a Conveyor
Self Review 4

5. Flexible Manufacturing Cells

Segment 1 - Conditional Commands

Objective 1 - Describe the Function of a Flow Chart and How to Construct One
Skill 1 - Construct a Flow Chart Given a General Sequence of Operations
Objective 2 - Describe the Function of Conditional Commands and Give an Advantage
Objective 3 - Describe the Operation of the Conditional Commands: If-Then, Else, Endif, and Inp
Skill 2 - Enter a Robot Program that Has Conditional Commands: If-Then, Else, Endif, and Inp
Skill 3 - Design a Robot Program That Sorts Parts
Self Review 1

Segment 2 - Flexible Manufacturing Cells

Objective 4 - Describe How Robots Are Applied to Multiple Machine Loading Cells and Give an Advantage
Skill 4 - Design a Robot Program That Will Unload Two or More Automatic Machines
Self Review 2

Segment 3 - Subroutine Commands

Objective 5 - Describe the Function of a Subroutine and Give an Advantage
Objective 6 - Describe the Operation of the Subroutine Commands: Call, Return, and Sub
Skill 5 - Enter a Robot Program That Has Subroutine Commands: Call, Return, and Sub
Skill 6 - Design a Robot Application Using a Subroutine
Self Review 3

Segment 4 - Servo Conveyor Operation

Objective 7 - Describe Two Methods of Controlling Conveyors and Give an Advantage of Each
Objective 8 - Describe the Operation of the Robot Command Ddmove
Objective 9 - Describe How to Vary the Speed of a Conveyor Controlled by a Robot
Skill 7 - Enter a Robot Program That Has a Ddmove Command
Skill 8 - Design a Robot Program That Uses a Servo Conveyor
Self Review 4

6. Quality Control

Segment 1 - Cartesian Coordinate Programming

Objective 1 - Explain How the Cartesian Coordinate System Is Used with Robots
Skill 1 - View the Current Location of a Robot in Cartesian Coordinates
Objective 2 - Describe How a Move Command Is Specified Using Cartesian Coordinates
Skill 2 - Use the Pmove Function with Cartesian Coordinates to Move a Robot to a Position
Skill 3 - Enter a Robot Program That Uses Points Stored in Cartesian Coordinates
Self Review 1

Segment 2 - Go/No-Go Inspection

Objective 3 - Describe How Robots Are Applied to a Go/No-Go Inspection

Objective 4 - Describe the Operation of the Command: Testi

Skill 4 - Enter a Robot Program That Has the Testi Command

Skill 5 - Design a Robot Program to Perform a Go/No-Go Inspection

Self Review 2

Segment 3 - Robot Operator Interface

Objective 5 - Explain How Robots and Operators Communicate with Each Other and Give an Application

Objective 6 - Describe the Function of Two Types of Variables

Objective 7 - Explain Five Rules for Naming Variables

Objective 8 - Describe Two Ways Variable Names Can Be Used with Move Commands

Skill 6 - Enter a Robot Program That Uses a Variable Name

Objective 9 - Describe the Operation of the Operator Interface Commands: Print and Println

Skill 7 - Enter a Robot Program That Uses the Print and Println Commands

Skill 8 - Design a Program That Provides an Operator Interface on a Computer Screen

Self Review 3

Segment 4 - Parts Measurement

Objective 10 - Explain How Robots Are Used to Measure Parts

Objective 11 - Describe the Operation of the Measuring Command: Measure

Skill 9 - Enter a Robot Program That Has a Measure Command

Skill 10 - Design a Robot Program to Inspect Parts by Measuring Them in the Robot's Gripper

Self Review 4

7. Production Control

Segment 1 - Operator Input Interface

Objective 1 - Describe the Operation of the Input Command

Skill 1 - Enter a Robot Program That Uses an Input Command

Self Review 1

Segment 2 - Relational and Arithmetic Operators

Objective 2 - List and Describe the Function and Operation of Four Basic Arithmetic Operators

Objective 3 - List and Describe the Function and Operation of Six Relational Operators

Skill 2 - Enter a Robot Program That Uses Arithmetic and Relational Operators

Skill 3 - Design a Robot Program That Stops a Production Process If a Quality Standard Is Not Met

Self Review 2

Segment 3 - Loop Commands

Objective 4 - Describe the Function of a Loop Command

Objective 5 - Describe the Operation of the Loop Commands: For-Next and Step

Skill 4 - Enter a Robot Program That Has Loop Commands

Skill 5 - Design a Robot Application Using For-Next Commands

Self Review 3