

**ROBOTICS TECHNICIAN  
(Time-Based)**

**APPENDIX A**

O\*NET CODE: 17-3024.01

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

**WORK PROCESSES**

**Approximate Hours**

**A. Workplace Knowledge and Safety**

**150**

1. Describe workplace organizational structure and maintain compliance with all standards of the workplace.
2. Understand and follow appropriate workplace policies and procedures, adhering to all local, State, and Federal regulations.
3. Describe and accurately follow detailed instructions and production processes.
4. Follow safety standards and regulations for robotic operations:
  - a. Properly use safety features and components to conduct safety procedures.
  - b. Perform work activities safely and responsibly in compliance with all workplace protocols.
  - c. Maintain work areas/stations.
  - d. Identify and report unsafe work conditions.
5. Use appropriate safety equipment, such as proper clothing and personal protective equipment (PPE), as necessary.
6. Demonstrate awareness of emergency procedures, such as lockout/tagout (LO/TO).

**B. Assembling Robotic Equipment and Components**

**650**

1. Understand the different types of robots used in manufacturing (Articulated; Cylindrical; SCARA (Selective Compliance Assembly Robot Arm); Cartesian; Delta; etc.) and their functions.
2. Identify robotic manufacturers (such as: UR, Staubli, FANUC, ABB, etc.), and understand their specifications.

3. Demonstrate knowledge of robotic components, such as: circuit boards, sensors, controllers, and encoders.
4. Assist engineers in the design and application of robotic systems.
5. Assemble robotic devices/systems, and related automated machinery; set-up for use:
  - a. Assemble robot controllers, end-of-arm tools, conveyors, and additional controllers, as needed.
  - b. Install new robotic systems in stationary positions or on tracks.
  - c. Align, fit, or assemble components, using hand tools, power tools, fixtures, and templates.
  - d. Assemble housings, jigs, fittings, or fixtures, using machine tools.

### **C. Programing Robotic Equipment**

**1000**

1. Program robots, using artificial intelligence software (if available) or interactive training techniques, to perform simple or complex tasks.
2. Understand the role of programmable logic controllers (PLCs) in the robotic/related automated machinery production process:
  - a. Describe components and functions.
  - b. Read relay ladder logic.
  - c. Demonstrate knowledge of multiple Input/Output (I/O) configurations.
  - d. Utilize PLC knowledge to trouble-shoot, repair, and maintain equipment and machinery.
3. Program complex robotic systems, such as vision systems.
4. Evaluate the efficiency and reliability of industrial robotic systems and learn to reprogram or calibrate to achieve maximum quantity and quality.
5. Adjust or repair industrial robot and/or related automated machinery components to ensure efficient operation.
6. Develop robotic path motions to maximize efficiency, safety, and quality.
7. Test performance of robotic assemblies, using instruments such as oscilloscopes, electronic voltmeters, or bridges.

### **D. Operating Robotic Systems**

**650**

1. Perform work on various types of robotic and gantry systems, including industrial robots used for placing products on production line (i.e., pick-and-place-systems).
2. Operate robots and/or related automated machinery to perform customized tasks (such as: assembly, material handling, inspection, etc.).
3. Modify computer-controlled robot movements.
4. Demonstrate ability to use a production program to modify positions programmatically.
5. Review process control documentation to ensure safe and efficient operation of robotic equipment or related automated machinery.
6. Utilize three-dimensional simulations to understand the development of robot/automated production systems, and their operations.

#### **E. Maintaining, Troubleshooting, and Repairing Robotic Equipment and Components**

1450

1. Perform preventative or corrective maintenance on robotic systems or components:
  - a. Read and interpret blueprints, schematics, and technical documents to maintain and repair robotic equipment.
  - b. Test performance of electrical, electronic, mechanical, or integrated systems or equipment.
  - c. Calibrate robot and related automated machinery, and test components.
  - d. Clean robot, controllers, or other automation machinery.
2. Troubleshoot robotic systems, using knowledge of microprocessors, programmable controllers, electronics, circuit analysis, mechanics, sensor or feedback systems, hydraulics, or pneumatics.
3. Adhere to industrial standards and procedures to troubleshoot errors and make recommendations to address the identified issues.
4. Perform troubleshooting and repair of associated robotic systems and subsystems:
  - a. Utilize computer networks to test robotic systems and equipment; analyze and interpret test results to identify potential issues or determine causes of operational problems or failures.

- b. Use PLC knowledge to troubleshoot, repair, and maintain equipment and machinery.
- c. Perform repairs using various hand tools, including but not limited to multimeters, oscilloscopes, wire strippers, screwdrivers, and wrenches.
- d. Repair programmable controllers, robot controllers, end-of-arm tools, or conveyors.
- e. Repair and modify wear on mechanical joints, seals, and mounts.
- f. Repair or replace pneumatic components and hydraulics using appropriate hand tools and devices.
- g. Make repairs to robots or peripheral equipment, such as replacement of defective circuit boards, sensors, controllers, encoders, or servomotors.
- h. Analyze and repair mechanical and electrical components of articulated robots, such as: linear actuators, elbows, and end effectors.
- i. Recalibrate robot perimeters.

**F. Data and Recordkeeping**

**100**

- 1. Maintain operation and service records of robotic equipment.
- 2. Maintain inventories of robotic materials and production supplies, such as sensors or cables.
- 3. Document robotic design or operational test results, including test procedures.
- 4. Accurately report or document how problems were addressed.

**Approximate Total Hours**

**4,000**

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>.*

## **ROBOTICS TECHNICIAN**

### **APPENDIX B**

#### **RELATED INSTRUCTION**

##### **Workplace Safety and Health**

1. General Workplace Safety
2. First Aid & CPR (minimum 6.5 hours)
3. Personal Protective Equipment (PPE)
4. Right-to-Know/Safety Data Sheets (SDS)
5. Sexual Harassment Prevention – must comply with Section 201-g of the Labor Law
6. Occupational Safety and Health Administration (OSHA) 10-Hour General Industry
7. OSHA 30-Hour General Industry (at option of sponsor)
8. Emergency Procedures (e.g., Lockout/Tagout (LO/TO))
9. Electrostatic Discharge (ESD) Training

##### **Trade Science and Theory**

1. Trade Math
2. Materials Science
3. Fundamentals of Mechanics, Electricity, and Electronics
4. Print Reading: Dimensional, Schematics, Hydraulic, Pneumatic, Electrical, and Electronic
5. Introduction to Engineering
6. Design Process and Principles
7. Engineering Tools and Practices
8. Manufacturing Practices and Procedures
9. Automated Machinery
10. Principles of Robotics
11. Robotic Components and Equipment
12. Hydraulics and Pneumatics
13. Motors and Controls
14. Programming Robotic Movement
15. Programmable Logic Controllers (PLC)
16. Vision Systems

17. Artificial Intelligence (if available)
18. Metrology
19. Mechanical Measurements
20. Measurement Tools and Methods
21. Testing Processes
22. Basic Troubleshooting Topics and Methods
23. System Maintenance and Repair Procedures
24. Basic Electronic Components and Equipment:
25. Circuit Fundamentals
26. Digital Electronics
27. Microprocessors
28. Computer Aided Design

### **Workplace Skills**

1. Records and Documentation
2. Report Preparation
3. Data Analysis
4. Oral and Written Communication Skills
5. Employer Specific Skills

### **Additional Topics as Required**

A minimum of 144 hours of Related Instruction is required for each Apprentice each year.

Appendix B topics are approved by New York State Education Department.