

# Introduction to Robotics

This certification provides foundational knowledge and hands on skills in robotics for industrial training environments. Emphasis is on robot safety and risk mitigation, robot components and coordinate systems, robot programming and motion, peripheral interfaces, commissioning and testing, and systematic troubleshooting. The program combines instructor led theory with paired lab work and practical exercises to develop competencies for operating, programming, and maintaining robotic systems.

## Industry Recognized Certification Topics

- Robotics overview and historical context
- Applications of robotics across industry and non industrial domains
- Robot safety, risk assessment, and machine safety standards
- System documentation and site requirements
- Robot components and anatomy
- Coordinate systems and frames of reference
- Robot motion fundamentals
- Teach point methodology and program structure
- Robotic programming languages and applications
- Peripherals and I/O integration
- Commissioning and testing
- Troubleshooting and diagnostic approaches for robot systems and peripherals
- Human robot collaboration concepts and safety
- Maintenance planning and preventive maintenance for robotic systems
- Optional awareness topics: Industry 4.0 implications for robotics and Green Production/ environmental considerations

Units - 11 / Labs - 11

## Industry Recognized Certification Competencies

- Explain the historical development of robotics and typical industrial applications
- Apply robot safety standards, perform basic risk assessments, and identify required protective measures
- Locate, interpret, and use required system documentation: operating instructions, installation and commissioning guides, maintenance procedures, and protective device descriptions
- Identify robot components and describe the function of joints, links, end effectors, sensors, and safety devices
- Define coordinate systems and teach points in the appropriate frame of reference
- Describe and program basic joint and Cartesian motions; understand motion interpolation and trajectory considerations
- Create structured robot programs using teach points and program flow best practices for repeatable tasks
- Interface peripherals and configure basic I/O for grippers, conveyors, vision systems, and other external devices
- Commission a robot cell: perform teach point verification, payload validation, reach and envelope tests, and basic calibration
- Perform troubleshooting and diagnostics on robot hardware, sensors, I/O, and peripheral interfaces using systematic methods
- Demonstrate safe operation procedures: start/stop sequences, emergency stop verification, interlock checks, and guarding compliance
- Implement preventive maintenance tasks and document maintenance per manufacturer procedures
- Demonstrate programming, motion, and troubleshooting competencies in instructor led labs and paired exercises
- Adhere to course delivery constraints and curriculum controls for distribution of course materials

