National Center for Supply Chain Automation

MASTER SYLLABUS

Robotics

Semester Credit Hours: 4.00

Prerequisites: OSHA Safety Standards, AC/DC Theory & Service, PLC & Variable Frequency Drives

## COURSE DESCRIPTION

This course introduces the basic principles of automated systems and describes the tasks that technicians perform on the job. Topics include the current state of robotics commonly used in industry, safe operation and implementation, common applications of robots and automated systems. Including components, configuration, programming, operation, and control. Upon completion, students should be able to understand the basic concepts of robotic systems in automation and apply knowledge in integrating robotics in industrial settings.

## STUDENT LEARNING OUTCOMES

Upon successful completion of the course, students should be able to perform the following:

* Knowledge of robotics [articulated, cobots] automatic guided vehicles, automated mobile robots, robotics, pick-to-light systems, pick-to-voice systems;
* Knowledge of Industry Safety Standards [AMR R15.08-1-2020 parts 2 & 3, ANSI/ITSDF B56.5-2019 part 2, ANSI/RIA R15.06-2012, RIA TR15.606-2016];
* Adhere to safety procedures for work around robots;
* Create save work areas using sensors and established standards;
* Knowledge of how to Interpret a robot program;
* Knowledge of how to start up and shut down a robot;
* Knowledge of how to modify a robot program;
* Knowledge of how to adjust position points, speed and other parameters to meet application needs;
* Skill in programming and operating robots;
* Knowledge of how to monitor robot operations;
* Knowledge of how to interface I/O devices to a robot;
* Skill with manual and automatic control using pendant and remote HMI devices;
* Knowledge of establishing PLC communication over networks.

**COURSE OUTLINE**

* Introduction to Robotics and classifications
* Robotic power sources and drive systems
* End of arm tooling
* Types of Sensors utilized in safety
* Sensor types and Vision systems utilized in control and processes
* System and Sensor troubleshooting techniques
* Implementing Safe operations
* Robotic controllers and programming input devices
* Programming robotic controllers
* Networking with Cybersecurity consideration
* Integrating Robotics into automated systems

NOTES:

-Robotic Industrial Association safety AMR standard R15.08-1-2020 parts 2 [install safety] & 3 [operator safety] [https://www.agvnetwork.com/r15-08-safety-amr]

-ANSI/ITSDF AGV standard B56.5-2019 part 2 [https://webstore.ansi.org/Standards/ANSI/ANSIITSDFB562019-2388609 ]

-ANSI/RIA Industrial Robot safety R15.06-2012

-RIA TR15.606-2016 Collaborative Robots [supplemental to R15.06]