National Center for Supply Chain Automation

MASTER SYLLABUS

Pneumatic and Hydraulic Systems

Semester Credit Hours: 3.00

Prerequisites: see ‘Entry Skills’ for recommended competencies

## COURSE DESCRIPTION

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Covering the Basics of hydraulic and pneumatic systems, including the physical properties of liquids under pressure. Topics include Pumps, motors, accumulators, valves and drive cylinders are studied. The design and assembly of both high and low pressure fluid control systems from standard components is experienced. Applications of fluids in robotic and industrial equipment systems are presented.

## ENTRY SKILLS

Before entering the course, students will be able to:

* Evaluate Algebra expressions
* Basic principles of Geometry
* Solve formulas for unknowns

## STUDENT LEARNING OUTCOMES

* Upon successful completion of the course, students should be able to perform the following: Demonstrate basic safety procedures when designing and assembling high pressure hydraulic and pneumatic systems;
* Use troubleshooting procedures to diagnose and repair hydraulic and pneumatic systems used in automated processes and robotic assemblies;
* Set-up and operate fluid powered valves, cylinders, controls filters, and actuators;
* Calculate functions and load requirements then design, select components and test complex fluid powered systems in a robotic or industrial environment;
* Recognize fluid power schematic symbols;
* Explain basic operation, construction and applications of typical industrial hydraulic components;
* Construct typical components using a print, and test run the system.

**COURSE OUTLINE**

* Safe use of fluid power systems
* How a fluid power system works
* Components of a fluid power systems
* Pressures and Forces
* Pascal's law
* Boyle’s law
* Bernoulli’s law
* Differences between Pneumatic and Hydraulic fluid systems
* Types and operation of Actuators
* Flow control methods
* Pressure control methods
* Speed control methods
* Vacuum generation
* Application of fluid power
* fluid power symbols, meaning and use
* Industrial drawings and schematics
* Fabrication, connections and troubleshooting fluid power systems