

Course Prefix/No.: IMT 131
Course Title: Hydraulics and Pneumatics
Lecture Hours/Week: 2.0
Lab Hours/Week: 6.0
Credit Hours/Semester: 4.0

[Distance Learning Attendance/VA Statement](#)
[Textbook Information](#)

COURSE DESCRIPTION

This course covers the basic technology and principles of hydraulics and pneumatics.

COURSE COMPETENCIES

Upon successful completion of this course, the student should be able to:

Module 1 - Pneumatic Theory

- Explain the principles of a pneumatic system.
- Discuss the advantages and disadvantages to using a pneumatic system.
- Define the following terms with relation to a pneumatic system
 - Force
 - Area
 - Weight
 - Mass
 - Diffusion
 - Absolute pressure
 - Inertia
 - Density
 - Pressure
 - Vacuum
 - Dispersion
 - Volume
- Explain the difference between atmospheric pressure and gauge pressure.
- Identify the difference between positive pressure and negative pressure.
- State the systems of measurement used to describe the amount of work done.
- With reference to pneumatic cylinders, calculate for values of force, pressure, and area.
- Calculate the amount of work done in a pneumatic system.
- Calculate the power of a pneumatic system.
- Explain and use the Laws of Pneumatics to solve for unknown values:
 - Boyle's Law
 - Charles' Law
- Explain Pascal's Law and Bernoulli's Law.
- Name the common components that are used in a pneumatic system.
- Draw and interpret schematic symbols and schematic diagrams of pneumatic systems.
- Inspect, troubleshoot, and maintain a pneumatic system to achieve maximum performance and efficiency.

Module 2 - Pneumatic Controls

- List and identify the different types of manually operated valves.
- List and identify the different types of automatically operated valves.
- Explain the purpose and operation of the pressure relief valve.
- Explain the purpose and operation of the flow control valve.

- Explain the purpose and operation of a pressure reducing valve.
- List the internal components that may be found in a pneumatic valve.
- Explain the meaning of Normally Open and Normally Closed valves.
- Identify and explain the differences between direct operated and pilot operated valves.
- Explain the operation of, and be able to identify all directional control valves.

Module 3 - Pneumatic Cylinders and Motors.

- Identify and explain the operation of all types of pneumatic cylinders.
- Identify and explain the operation of all types of pneumatic motors.

Module 4 - Hydraulic Theory

- Explain the principles of a hydraulic system.
- Discuss the advantages and disadvantages to using a hydraulic system.
- Explain the purpose of the reservoir.
- Explain and identify the difference between the high-pressure side and the low-pressure side of a hydraulic system.
- Explain the compressibility of fluid and the different types of pumps that are used in industry to compress the fluid.
- Explain the importance of fluid properties and the effects of a hydraulic system based upon these properties.
- Perform proper fluid selection for a given hydraulic system.
- Properly install and connect all components of any given hydraulic system.
- Define the following terms with relation to a hydraulic system.
 - Force
 - Pressure
 - Area
- State the systems of measurement used to describe the amount of work done.
- Calculate the force of a piston when pressure and the piston area are known.
- Calculate the area of a piston when the force and pressure are known.
- Calculate the pressure when force and piston area are known.
- Calculate the amount of work done in a hydraulic system.
- Calculate the power of a hydraulic system.
- Draw and interpret schematic symbols and schematic diagrams of hydraulic systems.
- Inspect, troubleshoot, and maintain a hydraulic system to achieve maximum performance and efficiency.

Module 5 - Hydraulic Controls

- Explain the purpose and operation of the pressure relief valve.
- Explain the purpose and operation of the flow control valve.
- Explain the purpose and operation of a pressure reducing valve.
- List the internal components that may be found in a hydraulic valve.
- Explain the meaning of Normally Open and Normally Closed valves.
- Identify and explain the differences between direct operated and pilot operated valves.
- Explain the operation of, and be able to identify all directional control valves.

Module 6 - Hydraulic Cylinders and Motors.

- Identify and explain the operation of all types of hydraulic cylinders.
- Identify and explain the operation of all types of hydraulic motors.

MINIMAL STANDARDS

Assignments and attendance must be completed as designated in "Evaluation Strategies/Grading." Criteria for minimal acceptable performance will be provided by the instructor.

REQUIREMENTS

Attendance Policy

The college attendance policy, stated in the college handbook, will be honored. The instructor will provide specific requirements for the course.

Academic Honesty

Students are expected to adhere to the college policy regarding student conduct as stated in the college handbook.

Assignments

Students are expected to complete all assignments and any supplementary exercises designated by the instructor.

EVALUATION STRATEGIES/GRADING

Successful completion of the course requires the completion of all modules with an average of 70 points. Grades will be calculated from work attitude, all tests/projects, homework assignments, and laboratory assignments.

Grading Scale:

A = 90.0 - 100

B = 80.0 - 89.9

C = 70.0 - 79.9

D = 60.0 - 69.9

F = 00.0 - 59.9

Evaluation Method:

Tests/Projects (minimum of four total)	40% for each Module
Lab Work	40% for each Module
Work Attitude	20% for each Module

Work Attitude is defined as:

- Participation
- Cooperation
- Appearance
- Effort
- Safety
- Responsibility
- Professionalism
- Attendance
- Self Motivation
- Works Independently

METHODS OF INSTRUCTION

This course may be offered in traditional classroom format or as a self-paced CD-based hybrid delivery format. Lectures, reading assignments, projects, discussions, video presentations, multimedia presentations, and web content are the major teaching methods used in this course.

ENTRY LEVEL SKILLS

A student entering this course should have an appropriate entrance score indicating an understanding of shop math and mechanical aptitude demonstrating interest in industrial mechanics.

PREREQUISITES: RDG 031 or equivalent and MAT 031 or equivalent

CO-REQUISITES: None

Disabilities Statement: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Offices (SR) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.

Effective: 2010SP