

COURSE INFORMATION

COURSE PREFIX/NO: **IMT 131**
COURSE TITLE: **Hydraulics & Pneumatics**
LEC HRS/WEEK: 3.0
LAB HRS/WEEK: 3.0
CREDIT HRS/SEMESTER: 4.0

DL ATTENDANCE/VA STATEMENT TEXTBOOK INFORMATION

COURSE DESCRIPTION:

This course covers the basic hydraulic terminology and principles of hydraulics and pneumatics.

COURSE COMPETENCIES:

Upon successful completion of this course the student must have demonstrated the capability to:

- Explain characteristics, advantages, and disadvantages of hydraulic and pneumatic systems
- Identify hydraulic and pneumatic system components and explain their uses
- Demonstrate ability to diagnose and correct problems in fluid power systems
- Demonstrate knowledge of properties, use care, and maintenance of hydraulic fluids.
- Demonstrate knowledge of properties of air (gases) and basic gas laws.
- Disassemble, define internal parts, repair and reassemble fluid power components
- Draw simple fluid power schematics and explain how the systems operate
- Demonstrate personal and shop safety at all times
- Demonstrate consistent safe use of hand and power tools
- Select proper tools for the job.

PERFORMANCE OBJECTIVES:

Given appropriate instruction the student will demonstrate capability to successfully perform each of the following projects. Success in these projects will be determined by instructor observation, instructor checklist, and/or physical evidence of success.

1. Explain characteristics, advantages, and disadvantages of hydraulic and pneumatic systems.
2. Identify hydraulic and pneumatic system components and explain their uses.
3. Demonstrate ability to diagnose and correct problems in fluid power systems.
4. Demonstrate knowledge of properties, use, care and maintenance of hydraulic fluids.
5. Demonstrate knowledge of properties of air (gases) and basic gas law.
6. Disassemble, define internal parts, repair, and reassemble fluid power components.
7. Draw simple fluid power schematics and explain how the systems operate.
8. Demonstrate personal and shop safety at all times
9. Demonstrate consistent safe use of hand and power tools
10. Select proper tools for the job.

COURSE REQUIREMENTS:

Employers need people who will be on the job when needed, be prepared to work, be able to work, get along with their supervisor and fellow employees, and who are willing to do whatever is necessary to get the job done and done well.

This means the employee must have the knowledge and the capability and, just as important, have the character and attitude that are necessary to enable the employee to "fit" into the organization.

ATTENDANCE POLICY

Anyone absent more than 20% of the scheduled course hours will be withdrawn from the class according to school policy as outlined in the school catalog. If a student is tardy (arrives after roll call or is late returning from break) as many three times it will count as one hour of absence.

The fourth time and each time the student is tardy after that will count as one hour of absence. If a student leaves the class early without the instructor's approval it will count as one hour, or more, of absence (depending on how early).

ACADEMIC HONESTY

Any student caught cheating or involved in other academic dishonesty will receive an "F" grade for the course and may be subject to further disciplinary action.

GRADING

Based on this concept, students in industrial maintenance will be graded on the following:

Citizenship (See Separate Handout)
Competencies and performance based objectives
Academic knowledge

CITIZENSHIP WILL COUNT 20% OF THE TOTAL COURSE GRADE

Competencies listed above are skills the student is expected to possess before he/she completes the course. They will be included as part of the grading criteria for tests and performance based objectives at appropriate times throughout the course.

For successful completion of the course, the student must score a minimum of 70% on each performance based objective.

PERFORMANCE BASED OBJECTIVES WILL COUNT 40% OF THE TOTAL GRADE

TESTING

The student will be tested a minimum of three times during the course. Tests may be "open book", "closed book" or both at instructor's option. Minimum passing score for test is 70%.

TEST GRADES WILL COUNT 40% OF THE TOTAL COURSE GRADE.

The minimum passing score for the course is 70%. The grading scale is as follows:

| Grade | Points |
|-------|-------------|
| A | 92.6 - 100 |
| B | 85.1 - 92.5 |
| C | 77.6 - 85 |
| D | 77.5 - 70 |

Evaluation Method

| | |
|-----------------------|-----|
| Written/Verbal Test | 40% |
| Performance Objective | 40% |
| Citizenship | 20% |

Any project or examination not completed will result in a grade of "incomplete" which will become an "F" if the project or examination is to be completed within 6 weeks of the semester. Make-up work will be scheduled at the instructor's convenience.

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: None.

CO-REQUISITES: None.

TOPIC/CONTENT OUTLINE:

Fluid Power Defined
Compressed Air System in Plant
Industrial Hydraulic System
Comparison: Air vs. Oil
Fluid Power Laws

Force, Work Power thru Fluids
Fluids Pressure to Mechanical Force
Mechanical Force to Fluid Pressure
Hydraulic Leverage
Static Head Pressure Suction Head
Pressure

Fluid Flow in:

Pipes
Tubing
Hoses
Plumbing Air Systems
Plumbing Hydraulic Systems
Selecting Piping Sizes
Pressure Loss through Flow
Pressure Drop through Flow

Cylinders:

Descriptions
Sizing
Air
Hydraulic
Force Calculations
Speeds and Controls
Synchronizing
Piston Seals
Rod Seals
Testing
Cushioned Cylinders
Misc. Cylinders Type Devices
Designing with Cylinders

Valves:

Three Major Classifications:

- Flow Control
- Pressure Control
- Directional Control

Open Center/Closed Center

- Manual Actuators
- Solenoid Actuators

Valves, Spool:

- 2 Way
- 3 Way
- Direct Acting
- Pilot Operated
- Actuators for 2/3 Way Valves

Valves:

- Thermal Relief
- Quick Exhaust
- Check
- Shuttle
- Cushion Relief
- Pumps, 3 Major Classes:
 - Gear
 - Vane
 - Piston
- Positive/non-positive
- Displacement
- Pressure Compensated
- Horse Power Calculations
- Cavitation
- Suction Design
- Testing

METHOD OF INSTRUCTION:

Formal classroom discussion, using book, components, and appropriate training aids, interspersed with "hands on" shop work for reinforcement.