

Course Code: MFX 150**Course Title:** Basic Hydraulics I**Department:** Applied Sciences and Technologies**Effective Date:** Summer 2026**PCS Code:** 1.2 - Occupational/Technical Instruction**CIP Code:** 47.0303**Repeatability:** 0

Credit Hours

Catalog Notation: 0.5-1-1**Credit Hour Distribution:**

Lecture: 0.5

Lab: 1

Clinical: 0

Total: 1

General Course Information

Catalog Description

Introduction to hydraulic power use and application; skills and knowledge needed to apply hydraulics in modern industry. Key topics and skills in hydraulic power and safety, hydraulic circuits, hydraulic schematics, principles of hydraulic pressure and flow, and hydraulic speed control circuits. Pumps and fluid friction.

General Course Objectives

Course takes learners through key topics and skills in hydraulic power.

Minimum Placement Levels

English	Reading	Math
Placement into ENG 098	Placement into CCS 098	Placement into MAT 059

Prerequisites

None

Methods of Evaluation

5 quizzes.

Instructional Materials and Additional Supplies

Amatrol Course Code

Course Content

General Learning Outcomes (GLOs)

- Critical Thinking and Information Literacy: Students will demonstrate the ability to evaluate perspectives, evidence, and implications, and to locate, assess, and use information effectively.
- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Introduction to Hydraulics	1. Define hydraulics and give an application. 2. Describe the function of five basic components of a hydraulic system. 3. Define hydraulic pressure and give its units of measurement. 4. Describe how to read a pressure gauge. 5. Utilize a hydraulic pressure gauge.	0.5	1	0
Power Unit Operation	1. Describe the operation of a hydraulic power unit. 2. Interpret the liquid level and temperature in the reservoir. 3. Summarize a hydraulic power unit.	0.5	1	0
Circuit Connections	1. Describe the function of a hydraulic schematic. 2. Make sense of the function of a hydraulic quick-connect fitting and give its schematic symbol. 3. Show how to connect and disconnect a hydraulic hose that uses quick-connect fittings. 4. Articulate the function of a tee and give its schematic symbol. 5. Show how a tee is used to connect two circuit branches together. 6. Assess the operation of a pressure gauge and give its schematic symbol.	0.5	2	0
Basic Cylinder Circuits	1. Describe the function of a hydraulic cylinder and give an application. 2. Summarize the operation of a double-acting cylinder and give its schematic symbol. 3. Show the function of a 4-way, 3-position DCV and give an application. 4. Perform the operation of a 4-way, 3-position DCV and give its schematic symbol. 5. Characterize and operate a double-acting hydraulic cylinder using a 3-position, manually-operated DCV. 6. Design a dual cylinder hydraulic circuit.	0.5	2	0
Pumps	1. Define flow rate and explain how it can be measured. 2. Describe the operation of two types of flow meters and give their schematic symbol. 3. Make sense of how to connect and read a flow meter. 4. Illustrate how to calculate flow meter accuracy. 5. Characterize the operation of a fixed-displacement pump and give its schematic symbol. 6. Subdivide the operation of four types of fixed-displacement pumps and give an application of each.	0.5	1	0
Needle Valves	1. Describe the main function of a needle valve. 2. Interpret the operation of a needle valve and give its schematic symbol. 3. Illustrate how to connect and operate a needle valve to control the speed of an actuator. 4. Perform control of the speed of an actuator using a manually operated DCV.	0.5	1	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Basic Motor Circuits	1. Describe the function of a hydraulic motor and give an application. 2. Make sense of the operation of a hydraulic motor and give its schematic symbol. 3. Perform connection and operation of a bi-directional hydraulic motor using a 3-position, manually-operated DCV. 4. Subdivide three types of hydraulic motors and give an application of each.	0.5	1	0
Hydraulic Schematics	1. Describe the eight basic rules for drawing hydraulic schematics. 2. Draw a hydraulic schematic from the actual circuit connections on a pictorial. 3. Interpret a hydraulic circuit given a schematic. 4. Modify a multiple actuator hydraulic circuit.	1	2	0
Pressure vs. Cylinder Force	1. Describe how to calculate the force output of an extending cylinder. 2. Calculate the extension force of a cylinder given its size and pressure. 3. Measure the force output of an extending cylinder. 4. Show how to calculate the force output of a hydraulic cylinder in retraction (pull). 5. Predict through calculation the retraction force of a cylinder given its size and pressure. 6. Formulate the force output of a retracting cylinder.	1	2	0
Hydraulic Leverage	1. Interpret Pascal's Law and explain its significance in hydraulics. 2. Point out how force is multiplied using Pascal's Law.	1	0	0
Fluid Friction	1. Describe two types of resistance in a hydraulic system. 2. Deduce how Delta P describes hydraulic resistance. 3. Deduce the Delta P across a hydraulic component. 4. Formulate how pressure is distributed in a hydraulic system.	1	2	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
7.5	15	0