

**WESTERN IOWA TECH COMMUNITY COLLEGE**  
**Course Syllabus**

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Term:  
Course Number and Section: EGT 142 \_\_\_\_  
Course Title: Fluid Power I  
Semester Hours: 2.00  
Meeting time/location:  
Instructor:  
Phone: 712.274.8733 Ext.  
E-mail: @witcc.edu  
Office Location:  
Office Hours:

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**COURSE DESCRIPTION AND PREREQUISITES/COREQUISITES:**

This course provides the basic principles and components of hydraulics and pneumatics through lecture and laboratory experiences. Students gain the ability to design and analyze common machinery and tools.

Prerequisite: None

Corequisite: None

**REQUIRED TEXTBOOKS/MATERIALS**

1. Amatrol. *Basic Hydraulics* -
2. Other Materials: Text\_Book: Basic Hydraulics  
Author: Amatrol

**COURSE OBJECTIVES**

The course will provide information which should enable the student to:

1. Identify the conditions that cause fluids to flow and exert pressure.
2. Explain Pascal's law.
3. Describe the relationship between fluid pressure and fluid flow.
4. Identify the factors that affect the pressure level, flow rate, and fluid velocity in a hydraulic circuit.
5. Identify components of a hydraulic circuit.
6. Describe the function of components of a hydraulic circuit.
7. Explain structure and operation of basic components.
8. Identify hydraulic symbols.
9. Describe basic structure and operation of unbalanced and balanced vane pumps and external and internal gear pumps.
10. Describe basic structure and operation of radial and axial piston pumps.
11. Identify methods of varying the displacement in vane pumps and radial and axial piston pumps.
12. Describe basic structure and operation of various types of motors and rotary actuators.
13. Describe basic structure and operation of various types of hydraulic cylinders.
14. Describe function of such cylinder devices as rod gland bushings and seals, piston seals, air bleed passages, stroke adjusters, stop tubes, and cushions.
15. Describe basic structure and operation of normally closed and normally opened pressure control valves.
16. Describe uses for relief, unloading, sequence, counterbalance, brake, and pressure reducing valves.
17. Describe basic structure and operation of flow control valve.
18. Explain how pressure compensation enables a flow control valve to maintain a desired flow rate regardless of pressure fluctuation.
19. Describe function and basic operation of One-Two-, Three- and Four-Way directional control valves.
20. Identify methods of spool actuation for directional control valves.
21. Identify characteristics that enable hydraulic fluid to perform required functions within a hydraulic system.
22. Describe the function, structure, and basic operation of reservoirs and accumulators.
23. Describe the structure of various types of conductors and fittings.
24. Describe the function and structure of various types of hydraulic seals.
25. Describe the structure and basic operation of various types of hydraulic filters.
26. Describe the structure and basic operation of various types of hydraulic heat exchangers.
27. Identify common hazards associated with hydraulic systems.

28. Describe proper procedures for working with various hydraulic components.
29. Describe factors that determine the intervals at which preventive maintenance tasks should be performed.
30. Identify basic categories of preventive maintenance tasks.
31. Describe inspections and tests that should be part of a preventive maintenance program.
32. Identify the factors that must be considered when evaluating the operation of a hydraulic system.
33. Identify types of tasks that should be part of a systematic troubleshooting procedure.
34. Identify symptoms of several hydraulic component and system malfunctions.
35. Identify possible causes of some common hydraulic component and system failures.

## CONTENT OUTLINE:

### Major topics

- I. Hydraulic Power
  - II. Hydraulic Circuit
  - III. Pumps and Actuators
  - IV. Control Valves
  - V. Hydraulic Fluids
  - VI. Hydraulic System Safety & Maintenance
  - VII. Hydraulic System Troubleshooting
  - VIII. Industrial Hydraulics
  - IX. Hydraulic Power Systems
  - X. Valve Basics
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- I. Hydraulic Power
    - A. Fluid flow
    - B. Pascal's law
    - C. Pressure and flow
    - D. Factors
  - II. Hydraulic Circuit
    - A. Components
    - B. Function of Components
    - C. Operation of basic components
    - D. Hydraulic symbols
  - III. Pumps and Actuators
    - A. Vane and Gear pumps
    - B. Radial and axial piston pumps
    - C. Varying displacement
    - D. Motors and rotary actuators
    - E. Hydraulic cylinders
    - F. Cylinder devices
  - IV. Control Valves
    - A. Flow control valves
    - B. Pressure compensation
    - C. Directional control valves
    - D. Spool Actuation
  - V. Hydraulic Fluids
    - A. Characteristics
    - B. Reservoirs and accumulators
    - C. Conductors and fittings
    - D. Hydraulic seals
    - E. Hydraulic filters
    - F. Heat exchangers
  - VI. Hydraulic System Safety & Maintenance
    - A. Hazards
    - B. Procedures
    - C. Preventive maintenance
    - D. Categories of preventive maintenance
    - E. Inspecting and testing
  - VII. Hydraulic System Troubleshooting
    - A. Evaluating hydraulic systems

- B. Procedure
- C. System malfunctions
- D. Causes of system failure

**COMPETENCIES:**

At the conclusion of the course the student will be able to:

1. Analyze hydraulic power systems.
2. Recognize, discuss and design basic hydraulic circuits.
3. Discuss the operation of a hydraulic pumps and actuators.
4. Identify and discuss the operation of hydraulic valves and components.
5. Discuss various types of hydraulic fluids.
6. Recognize and discuss the importance of hydraulic systems safety and maintenance.
7. Troubleshoot fluid power transmission systems.

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