



South Central College

MECA 2130 Fluid Power II

Course Outcome Summary

Course Information

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| Description | This course provides the basics of hydraulically operated devices and systems found in modern industrial machinery and automation. Topics include proper safety procedures, basic laws of fluid mechanics, standard symbols, pumps, control valves, control assemblies, actuators, maintenance procedures, and switching and control devices. At the completion of this course, the student will be able to design and specify characteristics of a hydraulic system, select and size actuators, and match the hydraulic component name with its American National Standards Institute (ANSI) symbol. Additionally, the student should be able to identify long-term symptoms associated with a lack of preventive maintenance of hydraulic components while demonstrating good safety practices including lock out procedures. Technical writing skills and safety procedures will be implemented throughout the course. (Prerequisites: MECA 2120) |
| Total Credits | 3 |
| Total Hours | 64 |

Types of Instruction

| Instruction Type | Credits/Hours |
|------------------|---------------|
| Lecture | 2/32 |
| Lab | 1/32 |

Pre/Corequisites

MECA 2120

Institutional Core Competencies

Communication - Students will be able to demonstrate appropriate and effective interactions with others to achieve their personal, academic, and professional objectives.

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

Course Competencies

1. Explain the basic concepts of hydraulics.

Learning Objectives

Define pressure.
Explain how pressure is created.
Define Pascal's Law, work and power.
Contrast series and parallel circuits.
Analyze pressure drop through orifices and pipes.
Recognize the differences between pipes and tubing.
Determine the size requirements and ratings of lines.

2. Comply with hydraulic safety procedures.

Learning Objectives

Identify and recognize hazard potentials.
Determine what can be done to prevent hazards.
Explain Lock Out/Tag Out procedure for hydraulics.
Identify the risk factors of accidents involving hydraulics.
Elaborate on how to safely de-energize a hydraulic system.

3. Discuss the principles of hydraulics.

Learning Objectives

Identify the compressibility of hydraulic fluids.
Define the principles of pressure.
Define the principles of flow.
Define unique units of measure used in hydraulics.
Identify hydraulic symbols.

4. Discuss hydraulic fluids.

Learning Objectives

Describe the purposes of the fluid.
Define the properties of fluids.
Acquire an understanding of different fluids and their application.

5. Explain hydraulic fluid conductors, connectors and seals.

Learning Objectives

Articulate the different types of fluid conductors and their use.
Compile information about different connector types and their use.
Discuss seal types and their uses.
Explain seal materials and their compatibility with different fluids.
Determine how to prevent leakage.
Troubleshoot leakage.

6. Explain reservoirs, fluid filters and contamination control.

Learning Objectives

Study the functions of a reservoir.
Identify the reservoir components.
Calculate reservoir sizing.
Convey the purpose of heat exchangers and their use.
Explain the effect of contamination on hydraulic machinery.
Measure the amounts and sizes of contaminants.
Identify sources of contamination.
Explain techniques to minimize contamination during assembly and servicing.
Describe how to specify filters.
Identify filter construction.
Troubleshoot reservoirs and filters.

7. Obtain working knowledge of hydraulic pumps.

Learning Objectives

Discuss displacement and its units.
Identify pump ratings.

Characterize volumetric efficiency.
Discuss types of pumps.
Troubleshoot hydraulic pumps.

8. Obtain working knowledge of hydraulic actuators.

Learning Objectives

Identify types of cylinders.
Identify types of hydraulic motors.
Discuss the use of hydraulic intensifiers.
Troubleshoot failures associated with actuators.
Troubleshoot hydraulic actuators.

9. Obtain working knowledge of directional valves.

Learning Objectives

Identify check valve types and their purposes.
Discuss two-way, three-way and four-way valves.
Describe direct-acting valves.
Identify multi-stage valves.
Categorize mounting styles.
Troubleshoot directional valves.

10. Obtain working knowledge of pressure controls.

Learning Objectives

Describe relief valves.
Discuss pilot operated sequence valves.
Identify unloading relief valves.
Explain pressure reducing valves.
Discuss direct acting, spool-type, pressure control valves.
Troubleshoot hydraulic pressure controls.

11. Obtain working knowledge of flow controls.

Learning Objectives

Describe flow controls methods.
Discuss temperature compensation.
Explain proportional flow control valves.
Troubleshoot hydraulic flow controls.

12. Explain cartridge valves.

Learning Objectives

Describe the advantages of cartridge valves.
Compare slip-in cartridge valves to screw-in cartridge valves.
Acknowledge various types of cartridge valves.

13. Obtain working knowledge of proportional valves.

Learning Objectives

Describe use of proportional valves.
Explain proportional solenoid valves.
Discuss proportional pressure control valves.
Discuss proportional flow control valves.
Discuss proportional directional control valves.
Explain load compensation.
Troubleshoot hydraulic proportional valves.

14. Obtain working knowledge of servo valves.

Learning Objectives

Explain mechanical servo valve.
Explain electrohydraulic servo valve.
Discuss single-stage spool-type servo valve.
Discuss two-stage spool-type servo valve.

Describe various electrohydraulic pilot stage devices.
Troubleshoot hydraulic servo valves.

15. Obtain working knowledge of electrohydraulic devices.

Learning Objectives

Describe various electrohydraulic pilot stage devices.
Explain direct drive electromechanical devices used in electrohydraulics.
Describe three-stage spool-type servo valve.
Explain typical sensors used in electrohydraulics.
Identify electronic controls use with electrohydraulic devices.
Troubleshoot electrohydraulic devices.

16. Understand the need for hydraulic accessories.

Learning Objectives

Identify accumulator types.
Describe gages commonly used.
Discuss sensors used in hydraulic systems.
Explain the need for calibration of gauges and sensors.
Troubleshoot hydraulic accumulators and sensors.

SCC Accessibility Statement

South Central College strives to make all learning experiences as accessible as possible. If you have a disability and need accommodations for access to this class, contact the Academic Support Center to request and discuss accommodations. North Mankato: Room B-132, (507) 389-7222; Faribault: Room A-116, (507) 332-7222.

Additional information and forms can be found at: www.southcentral.edu/disability

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