

## **MECH-270 HYDRAULICS** 4 CREDITS

### **SYLLABUS**

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#### **CATALOG DESCRIPTION**

This course teaches fundamentals of hydraulic systems used in industry mobile applications. Students learn industry-relevant skills including how to operate, install, analyze performance, and design basic hydraulic systems. This course will teach intermediate hydraulic components and system applications.

This course also teaches advanced hydraulic systems. The student will learn operation of advanced hydraulic systems applications, equipment installation, performance analysis of motors and pumps, accumulators, control, relief and check valves, equipment maintenance, and system design.

Prerequisites: MECH 230, 235, 240, 261

Semester Offered: Spring, On Demand

#### ***COMMON STUDENT LEARNING OUTCOMES***

*Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in...*

##### **BROAD AND SPECIALIZED LEARNING**

Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

##### **CRITICAL THINKING**

Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

##### **CULTURAL AND CIVIC ENGAGEMENT**

Students will act purposefully, reflectively, and ethically in diverse and complex environments.

##### **EFFECTIVE COMMUNICATION**

Students will exchange ideas and information with clarity in multiple contexts.

##### **INFORMATION LITERACY**

Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

##### **INTEGRATING TECHNOLOGIES**

Students will demonstrate fluency in the application and use of technologies in multiple contexts.

Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.

#### **COURSE LEARNING OUTCOMES**

*Upon successful completion of the course, the student will be able to...*

A copy of this approved syllabus is on file in the dean's office.

Updated 12/14/18

1. Hydraulic trainer component identification. Read a hydraulic pressure gauge. Identification of 850 power unit components. Read the liquid level and temperature in the reservoir. Operate a hydraulic power unit. Connect and disconnect a hydraulic hose that uses quick-connect fittings. Use a tee to connect two circuit branches together. Basic operation of a double-acting cylinder. Connect and operate a double-acting hydraulic cylinder using a 3-position, manually-operated DCV. Design a dual cylinder hydraulic circuit.
2. Connect and read a flow meter. Connect and operate a needle valve to control the speed of an actuator. Control the speed of an actuator using a manually-operated DCV. Connect and operate a bi-directional hydraulic motor using a 3-position, manually-operated DCV. Draw a hydraulic schematic from the actual circuit connections on a pictorial. Draw a hydraulic circuit given a schematic. Design a multiple actuator hydraulic circuit.
3. Calculate the extension force of a cylinder given its size and pressure. Measure the force output of an extending cylinder. Calculate the retraction force of a cylinder given its size and pressure. Measure the force output of a retracting cylinder. Verification of Pascal's Law for hydraulics. Demonstrate how distance is sacrificed to obtain force multiplication. Measure Delta P across a hydraulic component. Convert between absolute pressure and gage hydraulic pressure.
4. Connect a relief valve in a circuit to limit pressure in the system. Design a circuit to provide bypass flow. Connect and adjust a flow control valve to control speed of an actuator. Connect and operate a meter-in flow control circuit. Connect and operate a meter-out flow control circuit. Design independent speed control circuit. Design a two-speed actuator circuit. Calculate the extend speed of a hydraulic cylinder given its size and a flow rate. Calculate the retract speed of a cylinder given its size and a flow rate. Calculate the cylinder stroke time given its size and a flow rate.
5. Connect and adjust the pressure setting of a sequence valve. Connect and operate a pressure sequence circuit. Design a pressure sequence circuit. Design a two-sequence valve control circuit. Connect and adjust the pressure setting of a PRV. Connect and operate a reduced pressure circuit. Design a hydraulic circuit that uses a pressure reducing valve.
6. Connect and operate a hydraulic DCV with a tandem center. Select the spool option for a hydraulic DCV based on the application information. Connect and operate a hydraulic 4/2 DCV. Connect and operate 4/2 DCV to function as a 3/2 DCV. Design a hydraulic circuit using a 2-position DCV. Connect and operate a hydraulic pilot-operated DCV. Connect, adjust and operate a cam-operated hydraulic valve. Design a hydraulic sequence circuit using a cam-operated hydraulic valve. Design a rapid traverse-slow feed hydraulic circuit using a cam-operated valve.