

Discipline: Agriculture	Sub-discipline: Mechanized Agriculture
General Course Title: Hydraulics	Min. Units: 3 Semester
Proposed Suffix: L	
<p>Course Description: This course is an introduction to the principles of hydraulics applied to farm and light industrial equipment. Includes a study of the technical language of fluid power, including graphical symbols, industrial standards, components, and maintenance of hydraulic units. Laboratory required.</p>	
Required Prerequisites or Co-Requisites ¹	
Advisories/Recommended Preparation ²	
<p>Course Objectives: <i>At the conclusion of this course, the student should be able to:</i></p> <ul style="list-style-type: none"> • Know the nomenclature of hydraulics and use the proper symbols • Understand the laws applying to enclosed liquids • Understand the various components used in hydraulic systems • Determine component compatibility • Be able to make changes of components in the system and reconnect for proper operation • Solve problems involving pressure and flow • Learn the principles of hydraulics and develop competency in diagnosis and repair of hydraulic systems • Develop competency in the safe diagnosis and repair of hydraulic systems. • Demonstrate ability to communicate and work cooperatively with others 	
<p>Course Content:</p> <ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> a. Basic principles of hydraulics b. How a hydraulic system works c. Comparing open and closed systems d. Uses of hydraulics 2. Hydraulic pumps <ol style="list-style-type: none"> a. Displacement of pumps b. Types of pumps c. Gear pump d. Vane pump e. Piston pump f. Pump efficiency g. Pump failures and remedies <p>Hydraulics (Content Continued)</p> <ol style="list-style-type: none"> 3. Hydraulic valves <ol style="list-style-type: none"> a. Relief valves b. Pressure reducing valves c. Pressure sequence 	

¹ Prerequisite or co-requisite course need to be validated at the CCC level in accordance with Title 5 regulations; co-requisites for CCCs are the linked courses that must be taken at the same time as the primary or target course.

² Advisories or recommended preparation will not require validation but are recommendations to be considered by the student prior to enrolling.

- d. Unloading valves
 - e. Check valves
 - f. Rotary valves
 - g. Spool valves
 - h. Flow control valves
 - i. Flow divider valves
 - j. Valve failure and remedies
4. Hydraulic cylinders
- a. Piston cylinders
 - b. Vane cylinders
 - c. Maintenance of cylinders
 - d. Seals
5. Hydraulic motors
- a. Gear motors
 - b. Vane motors
 - c. Piston motors
 - d. Motor efficiency
 - e. Motor failures and remedies
6. Hydraulic Accumulators
- a. Use of accumulators
 - b. Pneumatic accumulators
 - c. Weight-loaded accumulators
 - d. Spring-loaded accumulators
7. Hydraulic Filters
- a. How and why filters are used
 - b. Types of filters
 - c. Contamination
 - d. Maintenance of filters
8. Reservoirs
- a. Capacity
 - b. Features of reservoirs
9. Oil coolers
- a. Types
 - b. Location
10. Hoses, lines, and connectors
- a. Selecting hoses
 - b. Installation of hoses
 - c. Hose failures
 - d. Hose findings

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11. Hydraulic fluids
- a. Properties of fluids
 - b. Maintenance of fluids
 - c. Keeping fluids clean
12. General Maintenance
- a. Cleanliness

<ul style="list-style-type: none"> b. Cleaning and flushing systems c. Preventing leaks d. Preventing overheating e. Preventing air-in-oil problems f. Checking system before operation g. Safety rules 	
<p>13. Diagnosis and testing of hydraulic systems</p> <ul style="list-style-type: none"> a. Seven basic steps b. Testing the machine c. Troubleshooting charts 	
<p>Laboratory Activities: Individual Laboratory Activities are designed to support course objectives.</p>	
<p>Methods of Evaluation: Lecture Comprehensive Quizzes and Exams Written Critical Thinking Scenarios Problem Analysis and Solution Research and Term Papers</p>	<p>Methods of Evaluation: Laboratory Laboratory Skill Validation by Observation Laboratory Reports Diagnostics and Problem Solving Laboratory Skill Practicum Certification Exams</p>
<p>Typical Textbooks, Manuals, or Other Support Materials <u>Hydraulics, John Deere</u></p>	
<p>Statewide Articulation: CPSLO-BRAE 312, CSUF-AE411, UCD-ABT 142, other universities as lower division elective</p>	
<p>FDRG Lead Signature:</p>	<p>Date:</p>
<p>Mark E. Bender, PhD CSU Stanislaus</p>	
<p>[For Office Use Only]</p>	<p>Internal Tracking Number</p>
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