

SOUTHEAST COMMUNITY COLLEGE
TRANSPORTATION DIVISION
JOHN DEERE CONSTRUCTION & FORESTRY EQUIPMENT TECH
COURSE SYLLABUS
December 14, 2022

I. CATALOG DESCRIPTION

Course Number: JDCE2350
Course Title John Deere C&F Hydraulics and Hydrostatic Drives
Prerequisite(s): JDCE1901, JDCE2320
Co-requisite(s): None

Catalog Description: This course explains the basics of power transfer in hydraulic and hydrostatic drive systems by means of system flow, pressure, area and force. The design and function of hydraulic and hydrostatic pumps, motors, control valves, cylinders, seals, accumulators, reservoirs, coolers, filters, lines, fittings and fluids are explained. Topics include, open-center and closed-center hydraulic systems, pressure compensated and load sensing hydraulic systems, electro-mechanical and electro-hydraulic system controls, and hydrostatic drive transmissions used in John Deere construction equipment. The use of hydraulic symbols, diagrams, schematics, service tools, diagnostic tools and test equipment is demonstrated. Hands on lab activities include diagnostics, testing, system adjustments, and calibrations on John Deere construction equipment hydraulic systems and hydrostatic drive transmissions. Safety while working with stored energy and hydraulic systems will be practiced.

Credit Hours: 6
Class Hours: 45
Lab Hours: 135
Total Contact Hours: 180

II. COURSE OBJECTIVES: *Course will:*

- A.** Explain safety practices for hydraulic systems and the dangers of stored energy.
- B.** Demonstrate how to discharge and neutralize stored energy in a hydraulic system.
- C.** Explain the relationship between pressure, area, force, flow, work, and power in hydraulic systems.
- D.** Explain the design, function and differences of open-center and closed-center hydraulic systems.
- E.** Demonstrate how to translate hydraulic symbols, and use diagrams and schematics for diagnostics.
- F.** Explain the design and function of hydraulic valves for pressure, flow and directional control.
- G.** Explain the design and function of hydraulic cylinders and hydraulic seals.
- H.** Explain the design and function of hydraulic accumulators.
- I.** Demonstrate how to charge nitrogen gas hydraulic accumulators.
- J.** Explain the design and function of reservoirs, oil coolers, filters and hydraulic fluids.
- K.** Demonstrate hydraulic system maintenance practices.
- L.** Demonstrate how to identify and use hydraulic hoses, pipes, tubes, fittings and couplers.
- M.** Explain the design and function of hydraulic and hydrostatic drive pumps.

- N. Explain the design and function of pressure compensated and load sensing hydraulic systems.
- O. Provide the opportunity to disassemble inspect and reassemble radial piston and axial piston hydraulic pumps.
- P. Explain the design and function of hydraulic and hydrostatic drive motors.
- Q. Explain the design and function of electro-mechanical and electro-hydraulic system controls.
- R. Explain the design, function, and operation of hydrostatic drive transmissions.
- S. Demonstrate the use of hydraulic and hydrostatic drive systems diagnostic test equipment.
- T. Demonstrate hydraulic system tests and adjustments.
- U. Provide the opportunity to perform hydraulic system diagnostics, tests and adjustments.
- V. Demonstrate hydrostatic drive transmission system tests, adjustments and calibrations.
- W. Provide the opportunity to perform hydrostatic drive transmission system tests, diagnostics, adjustments and calibrations.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

A. STUDENT LEARNING OUTCOMES: *Student will be able to:*

1. Work safely with hydraulic systems and know the dangers of stored energy.
2. Discharge and neutralize stored energy in a hydraulic system.
3. Use knowledge of pressure, area, force, flow, work, and power in hydraulic systems to solve problems
4. Diagnose, repair and adjust open-center and closed-center hydraulic systems.
5. Translate hydraulic symbols, and use diagrams and schematics for diagnostics.
6. Diagnose problems related to hydraulic valves used for pressure, flow and directional control.
7. Repair or replace hydraulic cylinders and hydraulic seals.
8. Charge nitrogen gas hydraulic accumulators.
9. Perform hydraulic system maintenance.
10. Identify, service and use hydraulic hoses, pipes, tubes, fittings and couplers.
11. Use hydraulic and hydrostatic drive systems diagnostic test equipment.
12. Diagnose, repair or replace hydrostatic drive pumps.
13. Diagnose, repair or replace radial piston and axial piston hydraulic pumps.
14. Diagnose, repair or replace hydraulic and hydrostatic drive motors.
15. Diagnose, repair and adjust, electro-mechanical and electro-hydraulic system controls.
16. Perform hydraulic system tests, diagnostics, repairs and make system adjustments.
17. Perform hydrostatic drive transmission system tests, diagnostics, repairs, adjustments and calibrations.

B. GENERAL EDUCATION LEARNING OUTCOME:

GELO 3: Critical Thinking & Problem Solving

1. Collect, identify, interpret and analyze data.
2. Synthesize information to arrive at reasoned solutions to problems.
3. Acquire and integrate knowledge and construct relationships across disciplines.

IV. CONTENT/TOPICAL OUTLINE

- A. Safety rules for hydraulics
- B. Basic principles of hydraulics. Pressure, area, force, flow, work, and power
- C. Open-Center and Closed-Center hydraulic systems
- D. Hydraulic symbols, diagrams and schematics
- E. Hydraulic valves. Pressure control, directional control, flow control

- F. Hydraulic cylinders and hydraulic seals
- G. Hydraulic accumulators
- H. Reservoirs, oil coolers, filters hydraulic fluids and general maintenance
- I. Hydraulic system hoses, pipes, tubes, fittings and couplers
- J. Hydraulic and hydrostatic drive pumps
- K. Pressure compensated and load sensing hydraulic systems
- L. Radial piston pump and axial piston pump labs
- M. Hydraulic and hydrostatic drive motors
- N. Hydraulic and hydrostatic drive electro-mechanical and electro-hydraulic system controls
- O. Hydrostatic drive transmissions
- P. Hydraulic and hydrostatic drive systems diagnostic test equipment
- Q. Hydraulic system testing and adjusting. Flow and pressure
- R. Hydraulic system diagnostics, testing and adjusting lab activity
- S. Hydrostatic drive transmission system testing, adjusting and calibrations
- T. Hydrostatic drive transmission system diagnostics, testing, adjusting and calibration lab activity

V. INSTRUCTIONAL MATERIALS

Required text(s): Service Advisor (made available in the classroom)
FOS Hydraulics
FOS Power Trains

Other material(s): Required tool set, safety glasses (regulation Z87), leather shoes, John Deere uniform, colored pencils, notebook, writing instruments, calculator

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:

1. Small and large group discussion
2. Video presentations
3. Demonstrations
4. Project boards
5. Flip charts
6. Handouts
7. Observations
8. Field trips

VII. METHODS OF EVALUATION

A. Methods of evaluation typically include a combination of the following:

1. Notebook (if required)
2. Quizzes
3. Tests
4. Lab Grades
5. Reflection assignments
6. Lab/classroom presentations

Grading will follow the SCC Standard Grade Scale Policy. See **Course Information Document** for specific details on how the course grades are calculated.

VIII. SPECIFIC COURSE REQUIREMENTS:

- A. Students must complete all tests, projects, assignments, and notebook (if required).
- B. Students must earn a final grade of 70% (2.0) or higher.
- C. Program safety rules will be followed. See the **Course Information Document** for any additional safety rules established by the instructor.
- D. Safety belts will be worn at all times, on or in any motorized vehicle, if equipped.
- E. Attendance and participation. See **Course Information Document** for attendance and participation policy.