

SOUTHEAST COMMUNITY COLLEGE
TRANSPORTATION OCCUPATIONS
DIESEL-AG EQUIPMENT SERVICE TECH
COURSE SYLLABUS
October 16, 2020
[Syllabus Statements](#)

I. CATALOG DESCRIPTION

Course Number: AGST1140
Course Title: Electrical Systems II & Fuel Systems I
Prerequisite(s): None

Catalog Description: Basic principles and applications of the safe operation and testing of cranking, lighting, and accessory circuits and components. Emphasis is placed on OEM Diagnostic Tools and on-board diagnostic procedures used for identifying and repairing faults with CAN BUS controllers, sensors, actuators, wiring, and connections in a manner which is safe for the technician and the equipment. Theory of operation, construction, safe testing and repair of diesel engine fuel systems and air induction and exhaust systems, valve timing and injection timing. Physical and chemical properties of distillate fuels as well as alternative fuels used in current internal combustion engines. Safe procedures for storage, use and testing of diesel fuels.

Credit Hour: 3.0
Class Hours: 15
Lab Hours: 90
Total Contact Hours: 105

II. COURSE OBJECTIVES: *Course will:*

- A. Teach the theory of operation, construction, testing, maintenance, and repair of various types of cranking circuits.
- B. Teach the theory of operation, construction, testing, maintenance, and repair of various types of manual and electromagnetic switches.
- C. Teach the theory of operation, construction, testing, maintenance, and repair of various types of cranking motor drives.
- D. Teach the theory of operation, construction, testing, maintenance, and repair of electronic and conventional ignition systems.
- E. Explain shop procedures in a manner, which will prevent the occurrence of lead acid battery explosions and acid burns while performing service operations.
- F. Teach immediate first aid to the victim of a lead acid battery explosion or acid exposure.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

A. STUDENT LEARNING OUTCOMES: *The student will be able to:*

- 1. Measure fluid pressures and convert readings to absolute pressure scale
- 2. Calculate relative pressures in a system and the relationship between force, area, and pressure

3. Calculate changes in boiling point of a fluid related to the pressure on the fluid
4. List current sources of fuels, and future sources including alternative fuels
5. Explain fractional distillation processes of crude oil and other refinery processes used to produce fuels, lubricants, and other petroleum products
6. Describe combustion requirements of modern engines and the result of using poor quality fuels
7. List common limiting requirements established by regulatory agencies including common testing methods for fuels
8. Safely store and handle fuels with minimal exposure to risks involved, while insuring minimal contamination and degradation
9. Explain the need for accurate timing of engine functions for maximum performance and economy
10. Explain the importance of speed and load advance and ignition timing accuracy
11. Explain the importance of air / fuel mixtures under all operating conditions and engine design characteristics
12. Explain the function, construction, maintenance, testing, and repair of fuel system components for Gasoline, Diesel, and LPG engines
13. Describe the theory of operation, construction, overhaul, and adjusting of common carburetors for gasoline and LPG engines
14. Read and comprehend technical information found in textbooks, manuals and operating instructions used in the classroom and lab.
15. Use basic hand tools to perform service and repair operations in the lab.
16. Use a digital and analog meter to perform tests on cranking, ignition, and accessory circuits in a safe, accurate and effective manner.
17. Analyze electrical circuit schematics to identify variable values in any electrical circuit, using basic math skills and the fundamental laws associated with electrical circuits.
18. Operate a battery load tester and assorted battery service tools provided by SCC to test a cranking motor circuit.
19. Read and comprehend technical information found in technical manuals and textbooks
20. Perform vacuum and gage pressure tests on a running engine
21. Perform various fuel properties tests for gasoline and Diesel fuels
22. Perform valve timing check on poppet valve engines
23. Perform maintenance and repair of turbocharged engines complete intake and exhaust systems
24. Trace fuel flow through a complete Diesel fuel system on a running engine

B. GENERAL EDUCATION LEARNING OUTCOMES:

GELO #3: Critical Thinking & Problem Solving

Outcomes:

1. Collect, identify, interpret and analyze data.
2. Synthesize information to arrive at reasoned solutions to problems.
3. Evaluate ideas presented in writing, medial, speech, or artistic presentations.
4. Evaluate the validity of arguments, alternatives, data, outcomes, and/or impacts of actions.
5. Acquire and integrate knowledge and construct relationships across disciplines.

IV. CONTENT/TOPICAL OUTLINE

- A.** Cranking motors, switches, and drives
- B.** Ignition circuits
- C.** Safety

- D. Tool room duty
- E. Physical principles
- F. Engine fundamentals
- G. Internal combustion engine fuels
- H. Air induction and exhaust systems
- I. Fuel system components

V. INSTRUCTIONAL MATERIALS

Required Text(s):

“Fundamentals of Service” – John Deere Chapters 7, 8, 9, 10, 11, & 14
 Fundamentals of Service, Engines - John Deere (Ch. 3, 4, 5 (pg. 1 - 12), & 6
 Fundamentals of Service, Fuels, Lubes, and Coolants - John Deere, Fuels Ch.
 Diesel Engine and Fuel system Repair – Dagele (Chapters 4, 13, & 14)
 Fundamentals of Service, Engines - John Deere (Ch. 3, 4, 5 (pg. 1 - 12), & 6
 Fundamentals of Service, Fuels, Lubes, and Coolants - John Deere, Fuels Ch.
 Diesel Engine and Fuel system Repair – Dagele (Chapters 4, 13, & 14)

Other Resources:

Delco Remy 1.2 Manual (provided by instructor) & Associated Equipment manuals of Operation, Testing, and Repair of electrical circuits and components.
 Diesel Fuels – Caterpillar

Outside Reading/Research Required:

Three Technical Reports based on articles found in a trade journal related to Agricultural Transportation.

Tools:

See current College catalog
 1st quarter tools
 2nd quarter tools
 Safety glasses w/ side shields (Z87 approved)
 Leather work shoes
 Remote start switch and test lead kit (purchase kit at SCC parts store)
 Pen & colored pencils

VI. METHODS OF PRESENTATION / INSTRUCTION

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

1. Lecture
2. Small and large group discussion
3. Video presentation
4. Transparencies
5. Demonstrations
6. Project boards
7. Flip charts

8. Handouts
9. Observations
10. Assigned lab projects
11. 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

Letter grades will be based on the SCC Standard Grade Scale Policy. **Note:** See course outline for specific details on how the course grades will be calculated.

VIII. SPECIFIC COURSE REQUIREMENTS

A. Student must:

1. Complete all tests, projects, assignments, and notebook (if required).
2. Earn a final grade of 70% (2.0) or higher.

B. Attendance:

1. Attendance is required for successful completion of this course.
2. This is an Engaged Learning course and students are expected to complete pre-class preparation assignments / homework and attend sessions for class, lab, including assignments missed due to absence.
3. Each instructor will inform students by means of a Syllabus and Course Information Document of attendance requirements at the first class meeting.
4. It is expected that students will be on time and present for all scheduled class / lab times unless PRIOR arrangements have been made with the instructor.
5. Missed class or lab sessions, regardless of cause, reduces the opportunity for learning and may affect student achievement of course learning outcomes and the student's grades.
6. Students are responsible for all content missed, regardless of the reason for the absence.
7. Students must, whenever possible, notify the instructor if unable to attend any class / lab session.
8. Emergency absences will be considered on an individual basis to determine if learning activities can reasonably be rescheduled during the current session.

C. Participation:

1. For every hour of classroom learning students are expected to perform two hours of related studies as homework or hands-on / simulated / on-line activities outside the classroom.
2. Students are expected to be responsible for meeting scheduled class / lab / homework & assigned due dates unless prior arrangements have been made with the instructor 24 hours before the due date.
3. Students are expected to complete all exams, quizzes, lab activities and assignments / homework at the scheduled times unless PRIOR arrangements have been made with the instructor before the due date and time.

4. When reasonably possible, and only when prior arrangements have been made, students may ask the instructor to have a test or exam rescheduled prior to 24 hours before the activities scheduled date and time.
 5. Unscheduled quizzes may be given at any time and may not be repeated or taken at a later time, unless approved by the instructor.
 6. Exceptions due to emergency absences will be considered on an individual basis.
 7. Please see the course outline for any additional attendance regulations established by the instructor.
- D. Program shop safety rules will be followed. Please see the course outline for any additional safety rules established by the instructor.**
- E. Perform necessary tool room duties.**