SOUTHEAST COMMUNITY COLLEGE
TRANSPORTATION OCCUPATIONS
DIESEL –AG EQUIPMENT SERVICE TECH
COURSE SYLLABUS
October 21, 2020

Syllabus Statements

I. CATALOG DESCRIPTION

Course Number: AGST2410
Course Title: Diesel Engines & Fuel Systems II
Prerequisite(s): AGST1220, AGST1240, AGST1260

Catalog Description: Theory of operation, design and construction of four stroke cycle engines. Safe and proper operation of engine test equipment; including Dynamometer setup and operation, cylinder compression, cylinder balance, and cylinder leakage testing. Theory of operation, design, construction and safe procedures for repair and maintenance of cooling systems for AG equipment engines.
Theory of operation, design, and construction of the engine valve trains. Safe and proper use of valve train service tools for disassembly, inspecting, measuring, reconditioning, and adjusting diesel engine cylinder heads and valve operating mechanisms.
Theory and design of diesel fuel injection systems, including fuels, nozzles, governors, fuel flow, filtering, handling, and storage. Diagnostics, testing, repair of pumps and nozzles, and common rail (hydraulic) and electronic operated systems. Fundamentals of safety while servicing and repairing fuel systems is emphasized.

Credit Hour: 5.5
Class Hours: 30
Lab Hours: 158
Total Contact Hours: 188

II. COURSE OBJECTIVES: *Course will:*

A. Cover the theory of four and two stroke cycle engine operation.
B. Cover crankshaft configurations.
C. Cover cylinder and valve arrangements.
D. Cover dynamometer theory, setup, operation, and documentation
E. Cover static timing of injection pumps and distributors.
F. Cover cylinder compression tests.
G. Cover the theory of operation, construction, maintenance, and testing of engine cooling systems.
H. Cover the proper use of lifting hoists, slings, chains, and lift trucks to safely move engines and engine components following the college's safety guidelines.
I. Cover safety procedures related to the Hazard Communication and Globally Harmonized Systems as well as specific program rules for tool and equipment use.
J. Identify various types of valve trains, combustion chambers, and common valve types.
K. Identify parts of a common engine poppet valve.
L. Analyze typical valve failures and determine the cause of failure.

M. Measure valves for the ability to be put into service.
N. Identify, compare, measure and inspect valve train components.
O. Define fuel combustion and fuel injection.
P. Define pump and nozzle principles.
Q. Define multi-plunger fuel systems.
R. Define distributor plunger fuel systems.
S. Teach how to safely test and adjust injection nozzles.
T. Define the various types of common rail fuel systems.
U. Show how to disassemble, inspect, repair, and adjust valve train assemblies.
V. Teach safety procedures related to the Hazard Communication and Globally Harmonized Systems as well as specific program rules for tool and equipment use.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

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

1. Read and comprehend technical information found in technical manuals and textbooks.
2. Operate dynamometers and engine performance instruments.
3. Draw and use power impulse diagrams and valve timing diagrams.
4. Disassemble engine components using proper hand and special tools.
5. Reassemble and adjust engine components using proper hand and special tools.
6. Perform various cooling system tests.
7. Overhaul common diesel engine coolant pumps.
8. Identify various types of valve trains, combustion chambers, and common valve types.
9. Identify parts of a common engine poppet valve.
10. Analyze typical valve failures and determine the cause of failure.
11. Measure valves for the ability to be put into service.
12. Identify, compare, measure and inspect valve train components.
13. Disassemble, inspect, repair, and adjust valve train assemblies.
14. Read and comprehend technical information found in textbooks, service manuals, and operating instructions used in the classroom and lab.
15. Use their basic hand tools to perform testing, servicing, and repairs in the lab.
16. Safely test, disassemble, adjust and reassemble nozzle assemblies.
17. Safely test, disassemble, adjust and reassemble injection pumps, in practical usage.
18. Perform diagnostics and repairs on live fuel systems.

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. Four stroke cycle engine principles
B. Two stroke cycle engines
C. Engine performance measurements

D. Static timing
E. Cooling system
F. Function
G. Nomenclature
H. Types
I. Failure analysis
J. Measuring
K. Reconditioning of valves
L. Valve guides
M. Camshafts
N. Cam followers
O. Rocker arm assemblies
P. Valve springs
Q. Valve seats
R. Valve timing
S. Fuel systems review
T. Nozzle review
U. Fuel injection pumps used on present equipment
V. Common rail fuel systems
W. Fuel system controllers

V. INSTRUCTIONAL MATERIALS

Text(s) Required:	Fundamentals of Service, Engines – John Deere Fundamentals of Service, Fuels, Lube and Coolants – John Deere Diesel Engines and Fuel System Repair – John Dagel
Outside Reading/Research Required:	Three Technical Reports based on articles found in a trade journal related to Agricultural Transportation, to be included in this session's notebook. Medium/Heavy Duty Truck Engines, Fuel & Computerized Management Systems 3rd Edition - Bennett
Other Resources:	"A&W PTO Dynamometer Data Book" Valve Grinding – Sioux Roosa Master Manual Package IHC Roosa Master Manual Caterpillar Manual American Bosch Manual Diesel Engine & Fuel System Repair 5thEdition, Dagel-Brady IHC Manual Covering Robert Bosch Required tools for 3rd Semester Safety glasses w/side shields (Z87 approved) Leather work shoes Pen & colored pencils Remote start switch and test lead kit (purchase kit at SCC Parts Store)

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
2. Quizzes
3. Tests
4. Lab grades
5. Class conduct

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

VIII. SPECIFIC COURSE REQUIREMENTS

A. Students must:

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

B. Program shop safety rules will be followed. Please see the course information document for any additional safety rules established by the instructor.

C. Perform necessary tool room duties.

D. 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.

E. 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.**