SOUTHEAST COMMUNITY COLLEGE
TRANSPORTATION OCCUPATIONS
DIESEL –AG EQUIPMENT SERVICE TECH
COURSE SYLLABUS
February 25, 2022
Syllabus Statements

I. COURSE DESCRIPTION

Course Number:	AGST 1031
Course Title:	Mobile Off-Road Equipment (MORE)-Lab
Pre-requisite(s):	First semester completion of SCC transportation division programs with a 2.0 minimum cumulative GPA or passing grade in the shop safety pre-test.
Pre-requisite or Co-requisite:	AGST 1030

Catalog Description: Lab performance activities for Mobile Off-Road Equipment Service. Concurrent with or separate from the lab hands on course (AGST1030). This course is intended for heavy duty construction equipment and will not address recreational off-road vehicles. Class 7 rough terrain lift truck operator certification will be included in the course. Safe operation, construction, function, diagnosis, service and repair topics in this course will be paired with AGST 1030 classroom course. This course is offered through the Continuing Education Division of SCC and is not a program-level course.

Credit Hour:	4
Class Hours:	0
Lab Hours:	180
Total Contact Hours:	180

II. COURSE OBJECTIVES: *Course will:*

A. Teach students how to demonstrate the requirements in place by OSHA and employers for certification and authorization as a certified lift truck operator.

B. Teach students how to maintain, service, diagnose and repair electronic systems, hydraulic systems, power train systems, breaking systems, track type undercarriage and wheel type drive systems used in mobile off-road equipment.

III. CONTENT/TOPICAL OUTLINE

A. Machine orientation & operating safety MORE: *The student will be able to;*

1. Demonstrate proper operating skills using a Class 7 Powered Industrial Lift Truck (Rough Terrain Forklift)
2. Perform a pre-start and walk-around inspection of wheeled equipment.
3. Move the class7 PILT with & without a load, park and shutdown the PILT.
4. Describe the rights and responsibilities of a Diesel Technician within the scope of OSHA Hazard Communication (GIS).

5. Locate, read and discuss a typical Safety Data Sheet for common use chemicals in a Diesel repair facility.

B. Electrical / Electronic systems – MORE: *The student will be able to;*

1. Perform diagnostic procedures to evaluate the condition and operation of machine sensors, sending units, and warning systems.
2. Select and use the appropriate test instruments for evaluating the operation of sensors, sending units, and alarm systems.
3. Identify and describe the construction and operation of warning devices and gauge systems.
4. Describe the operation of capacitance and resistive touch driver information screens.
5. Describe procedures to inspect, test, and adjust gauge sending units and circuits.
6. Identify and explain the advantages of electronic signal processing over mechanical system control.
7. Identify and describe the operating principles of electronic signal-processing systems used in electrical system.
8. Identify and describe the types of electrical signals and associated terminology.
9. Identify and describe the functions, construction, and application of electronic control modules.
10. Check for completion of HD-OBD monitors for an engine.
11. Diagnose an HD-OBD–related fault code using diagnostic trees, appropriate code priority, appropriate flow charts, and pinpoint tests.
12. Perform a terminating resistor check.
13. Measure resistance of terminating resistors.
14. Perform pinpoint voltage tests on a data link connector (DLC).
15. Check for shorts in the controlled area network.
16. Differentiate between electrical units of measurement for voltage, amperage, resistance, and power.
17. Calculate energy consumption in a heating circuit.

C. Hydraulic Systems - MORE: *The student will be able to;*

1. Identify different types and applications of hydraulic systems used on MORE, locate the components of a basic hydraulic system, explain the operating principles of hydraulic system components, identify basic hydraulic schematic symbols and identify types and construction features of hydraulic reservoirs.
2. Identify types hydraulic pumps and calculate pump displacement, flow, and horsepower for hydraulic pumps.
3. Demonstrate the operating fundamentals of hydraulic control valves.
4. Demonstrate the operating principles of hydraulic actuators and calculate the force or pressure and speed of a hydraulic cylinder.
5. Identify the functions and construction features and service procedures of hydraulic fluid filters.
6. Identify the locations, types and service procedures of hydraulic coolers and heaters.
7. Identify the construction features of hydraulic hoses and tubes, explain working pressure safety factor and burst pressure ratings for hoses and tubes, explain conductor sizing for proper fluid velocity, describe the different types of hydraulic fittings found on machines and describe the construction features of hydraulic seals.
8. Identify the construction features, and types of hydraulic accumulators and define accumulator safety precautions.

D. Power Trains - MORE: *The Student will be able to;*

1. Identify various types of clutches and flywheels used, identify the composition, construction, types, and applications of clutches and flywheels used & identify the various clutch linkage systems used.
2. Identify types of gears used, identify the construction features, composition, types, and application of gears used, describe the power flows of planetary gears used, calculate conventional gear ratios, gear speed, and torque multiplication and calculate planetary gear ratios.
3. Identify power reversers (power shuttles) and the construction and power flow of power shuttles.
4. Identify countershaft and planetary power-shift transmissions.
5. Trace the power flows of countershaft and planetary power-shift transmissions.
6. Identify and trace hydraulic clutch control systems used with power-shift transmissions.
7. Describe the common failures of power-shift transmissions and power shuttles and their root causes.
8. Perform recommended maintenance on power-shift transmissions and power shuttles.

E. Braking Systems – MORE: *The student will be able to;*

1. Demonstrate the fundamental operating principles of hydraulic braking systems.
2. Identify and describe hydraulic brake system components.
3. Identify the actuation components of an off-road hydraulic brake system.
4. Identify and describe the components of an off-road heavy-duty air brake circuit and their functions.
5. Describe the advantages and disadvantages of air brake systems.

F. Track drive & undercarriage systems – MORE: *The student will be able to;*

1. Identify and describe types of steel and rubber track drive undercarriage and major features of each track drive system.
2. Identify and describe major features of steel track drive systems.
3. Identify and describe common causes of accelerated undercarriage wear and normal progression of track wear.
4. Identify factors accelerating track component wear and lifecycle cost.
5. Evaluate track component wear, and make recommendations to minimize wear.
6. Perform track drive undercarriage inspection, adjustment, and repair procedures.
7. Recommend service and maintenance procedures for track drive undercarriage.

G. Wheel drive, steering and suspension – MORE: *The student will be able to;*

1. Identify wheel types, operation, functions, and mounting designs.
2. Perform wheel & tire maintenance and service.
3. Describe the service procedures for hubs, bearings, and seals.
4. Identify the steering, drive & suspension controls and warning devices in the operator station in operator stations.
5. Identify ROPS and FOPS protection systems.
6. Inspect operator station suspension systems.
7. Evaluate the performance of operator station HVAC systems.
8. Identify and inspect types of frames used with MORE.
9. Evaluate the operation and construction of tracked vehicle suspension systems.
10. Identify the construction, design, types, function, and operation of blades and frames, buckets, booms and arms, rippers and arms, hydraulic cylinders, tampers, rock breakers, and grapples.

11. Perform adjustment, lubrication, operational testing, and scheduled maintenance of attachments for wheeled equipment.
12. Perform operational tests of working attachments.
13. Outline recommended procedures for working attachment component inspection, removal, and replacement.

IV. INSTRUCTIONAL MATERIALS

Textbooks may be provided on loan from SCC for the duration of this course
CDX Mobile Heavy Equipment – Jones & Bartlett Learning ISBN: 978-1-284-11291-7
NSC Lift Truck Operator "Participant Guide" – (Part # 19941-0000)
Current SCC Diesel Technology students: first semester AGST/DESL required tools. All others will use first semester tool sets on loan from SCC for the duration of this course.

V. METHODS OF EVALUATION

A. Students will be given the opportunity to demonstrate their learned skills by performing diagnosis and repairs on lab projects. This knowledge will be evaluated by participation in classroom activities, completion of homework assignment, quizzes. discussions. On-line tests will be available over weekends.

B. The following criteria will be used to determine the student's final grade:
GRADE RUBRIC - CLASSROOM:
30% - Classroom participation activities
30% - Homework Assignments: Chapter questions, research assignments
30% - Quizzes / tests
10% - Discussions (on-line assignments)

C. Quizzes, as deemed necessary by the Instructor, may or may not be announced. Missed tests or quizzes can be made up if prior arrangements are made with the Instructor. See Attendance Requirements below for more information.

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.

VI. SPECIFIC COURSE REQUIREMENTS

A. Attendance:

1. **Attendance is required for successful completion of this course.**
2. This is an engaged learning course and students are expected to complete all classroom, lab and homework assignments.
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 homework hours, which have been assigned by the instructor, regardless of cause, reduces the opportunity for learning and may affect student achievement of course learning outcomes and the student's grade.
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 assigned classroom activities.

B. Participation:

1. Students are expected to be responsible for meeting instructor assigned due dates unless prior arrangements have been made at least 24 hours before the due date.
2. Students are expected to complete all CANVAS quizzes, assignments/homework at the scheduled times by the due date and time, unless PRIOR arrangements have been made with their instructor.
3. When reasonably possible, and only when prior arrangements have been made, students may ask the instructor to have course activities and assignments rescheduled prior to 24 hours before the scheduled date and time.
4. Exceptions will be considered on an individual basis.