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

I. COURSE DESCRIPTION

Course Number: AGST 1030
Course Title: Mobile Off-Road Equipment (MORE)-Classroom
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.

Catalog Description: Classroom theory for Mobile Off-Road Equipment Service. Concurrent with or separate from the lab hands on course (AGST 1031). 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 followed by hands-on tasks in the laboratory course AGST 1031. This course is offered through the Continuing Education Division of SCC and is not a program-level course.

Credit Hour: 3
Class Hours: 45
Lab Hours: 0
Total Contact Hours: 45

II. COURSE OBJECTIVES: *Course will:*

A. Teach student how to describe 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, braking systems, track type undercarriage and wheel type drive systems used in mobile off-road equipment.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES

A. GENERAL EDUCATION LEARNING OUTCOMES:
GELO #3: Critical thinking and problem solving.
Outcomes:
1. Students will have the ability to evaluate a problem or assumption and determine an appropriate course of action. They will be able to use reason and evidence to make judgement and decision.

IV. CONTENT/TOPICAL OUTLINE

A. Orientation - MORE: *The student will be able to;*

1. Classify off-road mobile equipment according to application and industry, identify and describe the purpose and functions, and identify design factors for the selection of MORE,
2. Describe the job requirements and identify the work and responsibilities of MORE technicians.
3. The student will be able to describe the OSHA requirements for Class 7 Powered Industrial Lift Trucks (PILT).
4. The student will be able to describe the procedures for a pre-start safety inspection.
5. The student will be able to describe how a class 7 PILT differs from other types of vehicles.
6. The student will be able to describe the stability triangle and center of gravity issues applied to ta PILT.

B. Electronic control systems and signal processing - MORE: *The student will be able to;*

1. Identify and explain the advantages of electronic signal processing over mechanical system controls, identify and describe the operating principles of electronic signal and associated terminology and describe the functions of electronic control modules.
2. Multiplexing systems: Identify and explain the purpose, construction, function and diagnosis of onboard communication networks.
3. Hydraulic Systems - MORE: The student will be able to;
4. Describe the fundamental principles of hydraulics, describe the advantages and disadvantages of hydraulic systems and describe Pascals Law and Bernoulli's principle.
5. Identify different types and applications of hydraulic systems used on MORE, list the components of a basic hydraulic system, explain the operating principles of hydraulic system components, identify basic hydraulic schematic symbols and describe the function, operating principles, types and construction features of hydraulic reservoirs.
6. Describe the types, construction and principles of operation of hydraulic pumps and calculate pump displacement, flow, and horsepower for hydraulic pumps.
7. Explain the purpose, types, construction and operating fundamentals of hydraulic control valves.
8. Explain the purpose, types, construction, and operating principles of hydraulic actuators and calculate the force or pressure and speed of a hydraulic cylinder.
9. Describe the function and construction features of hydraulic fluid filters.
   Discuss the function and construction features of hydraulic coolers and heaters.
10. Describe 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.
11. Explain the purpose, fundamentals, construction features, and types of hydraulic accumulators and hydraulic components and define accumulator safety precautions.

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

1. Explain the function and fundamentals of the various clutches and flywheels used, identify the composition, construction, types, and applications of clutches and flywheels used &identify and describe the various clutch linkage systems used.
2. Describe the principles of operation of clutches and flywheels used, and explain the fundamentals and operation of ancillary (PTO) clutches used.
3. Explain the purpose and fundamentals of gears used, identify the construction features, composition, types, and application of gears used, describe the fundamentals and principles of both the operation and the power flows of planetary gears used, calculate conventional gear ratios, gear speed, and torque multiplication and calculate planetary gear ratios.
4. Explain the purpose and fundamentals of power reversers (power shuttles) and the construction and power flow of power shuttles.
5. Explain the purpose and fundamentals of countershaft and planetary power-shift transmissions.
6. Identify the construction, types, and applications of the different types of power-shift transmissions used.
7. Describe the power flows of countershaft and planetary power-shift transmissions.
8. Explain the function and operation of hydraulic clutch control systems used with power-shift transmissions.
9. Describe the shift control logic of computer-controlled power-shift transmissions.
10. Describe the common failures of power-shift transmissions and power shuttles and their root causes.
11. Explain the overhaul procedures for power-shift transmissions and power shuttles.
12. Perform recommended maintenance on power-shift transmissions and power shuttles.

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

1. Explain the purpose and fundamentals of hydraulic braking systems.
2. Describe the principles of operation of hydraulic brake system components.
3. Describe the components of an off-road heavy-duty hydraulic foundation brake.
4. Describe the actuation components of an off-road hydraulic brake system.
5. Explain the fundamentals of pneumatics in off-road heavy-duty braking systems.
6. Describe the components of an off-road heavy-duty air brake circuit and their functions.
7. Describe the advantages and disadvantages of air brake systems.

E. 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. Explain the advantages, operating principles, and major features of track drive undercarriage systems.
3. Identify and describe major features of steel track drive systems.
4. Identify and describe common causes of accelerated undercarriage wear and normal progression of track wear.
5. Explain principles of differential steering systems.

6. Describe developmental stages of track drive system technology.
7. Identify factors accelerating track component wear and lifecycle cost.
8. Evaluate track component wear, and make recommendations to minimize wear.
9. Describe track drive undercarriage inspection, adjustment, and repair procedures.
10. Recommend service and maintenance procedures for track drive undercarriage.

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

1. Describe wheel types, operation, functions, and mounting designs.
2. Describe tire purposes, functions, construction, applications, and classifications for MORE; describe and perform tire maintenance and service.
3. Describe the functions, types, and construction of hubs, bearings, and seals.
4. Explain the purpose and fundamentals of operator stations.
5. Describe the function and operation of typical controls and warning devices in the operator station.
6. Explain the purpose and fundamentals of ROPS and FOPS protection systems.
7. Describe the purpose and fundamentals of operator station suspension systems.
8. Explain the function and operation of operator station HVAC systems.
9. Describe the purpose and fundamentals of frames used with MORE.
10. Identify the different construction, types design, and features of frames used with MORE.
11. Explain the purpose of suspension systems used with MORE.
12. Identify the different construction, types, design, and features of suspension systems used with MORE.
13. Describe the principles of operation and construction of tracked vehicle suspension systems.
14. Describe the different types of steering systems used for wheeled machines.
15. Describe the purpose, construction, applications, and operation of manual steering gears.
16. Describe 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.
17. Describe adjustment, lubrication, operational testing, and scheduled maintenance of attachments for wheeled equipment.
18. Perform operational tests of working attachments.
19. Outline recommended procedures for working attachment component inspection, removal, and replacement.

V. 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
Current SCC Diesel Technology students: first semester AGST/DESL required tools. All other will use first semester tool sets on loan from SCC for the duration of this course.

VI. 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.

VII. 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 and lab hours unless PRIOR arrangements have been made with the instructor.
5. Missed class and 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