Transportation Technology Services & Maintenance

Course Description

This second level semester course will expand on the basis concepts and systems utilized in the Transportation Industry. Modes of transportation, forms of energy, and power transmission will be addressed along with sub-systems of internal combustion engines. Tools, equipment, fasteners, safety and career exploration will be included in the course.

Course Code:

Program(s) of Study to which This Course Applies

- Mobile Equipment Maintenance

Course Framework	Reference Standards	Academic Crosswalk
Standard 1. Students will explore and present information on a selected career in the Automotive or Mobile Equipment Repair Industry.	TCC	
Benchmark 1.1 The student will research into various careers. <u>Sample performance indicators:</u> • Prepare a 1-2 page paper and 6 slide power point to be presented to the class. • Use a rubric evaluation.		LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.1.f (1) LA12.2.2.a (1) LA12.2.2.b (1) LA12.2.2.c (1) LA12.3.1.a (1) LA12.3.1.c (1)
Benchmark 1.2 The student will use the internet, guidance counselor, job shadow, and college visits to explore careers. <u>Sample performance indicators:</u> • Take a personal interest inventory.	CAPS/COPE NCE	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.1.f (1) LA12.2.2.a (1)

• Job shadow a career of interest. • Visit colleges of interest.		LA12.2.2.b (1) LA12.2.2.c (1) LA12.3.1.a (1) LA12.3.1.c (1)
Standard 2. Students will understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.	TRC206	
Benchmark 2.1 The student will follow all personal safety procedures and OSHA regulations. <u>Sample performance indicators:</u> • Practice wearing safety gear. • Adhere to MSDS guidelines.	OSHA, MSDS	SC12.1.1.d (2) LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1)
Benchmark 2.2 The student will follow all safety procedures while operating tools and equipment. <u>Sample performance indicators:</u> • Practice safe use of tools and equipment. • Comply with environment regulations and disposal.	OSHA, MSDS EPA	SC12.1.1.d (2) LA12.1.6.d (1) LA12.1.6.f (1)
Standard 3. Students will identify and know how to use tools, equipment, fasteners, measurement systems, and safety in the Transportation Industry.		
Benchmark 3.1 The student will understand USC and metric measurement systems. <u>Sample performance indicators:</u> • Perform measurements with various measuring tools. • Describe the basic for each measurement system.	ATGST NCTM	SC12.1.1.l (1) MA12.2.5 (2) LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1)
Benchmark 3.2 The student will demonstrate the use of the tools and equipment safely. <u>Sample performance indicators:</u> • Employ basic electrical safety in lab. • Demonstrate the proper handling of hazard materials.		LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1)

• Describe the use of fire extinguisher and safety equipment. • Demonstrate the safety precaution when operating a vehicle lift. • Explain the necessary the safety precautions when using power tools.		
Benchmark 3.3 The student will identify and select appropriate fasteners. <u>Sample performance indicators:</u> • List four different fasteners threads. • Explain bolt diameter, pitch, length, thread depth, grade marks. • Describe the advantage of torque to yield bolts. • Describe the proper procedure for torque to yield bolts.		LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1)
Standard 4. Students will understand the different Modes of Transportation.		
Benchmark 4.1 The student will research the modes of transportation. <u>Sample performance indicators:</u> • Define a transportation system. • List the five types of transportation systems. • Name several transportation system inputs. • Recognize several transportation system processes. • State the expected output of a transportation system. • Identify the types of goals that affect a transportation system. • Explain the function of feedback within a transportation system. • Make a list of devices used to provide feedback in transportation systems. • Describe the functions of at least one government agency that controls transportation.	EPTT	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)
Standard 5. Students will identify and distinguish the forms of renewable energy, inexhaustible energy sources, and power transmission.	EPTT	
Benchmark 5.1 The student will recognize renewable and inexhaustible energy sources. <u>Sample performance indicators:</u> • Identify the basic sources of renewable energy and inexhaustible energy. • Describe at least three different methods of producing power from renewable energy resources. • Describe at least six examples of different methods of producing power from inexhaustible energy resources.	EPTT	SC12.2.3.j (1) SC12.4.3.c (1) LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)

• Summarize several factors that influence the development of an energy resource. • Explain advantages and disadvantages of various conventional and alternative energy resources. • Discuss the environmental consequences most closely associated with the use of various conventional and alternative energy resources.		
Benchmark 5.2 The students will understand how the power transmission operates. <u>Sample performance indicators:</u> • List the six simple machines and give an example of each. • List three types of gears. • Name the two primary characteristics of power. • Identify two mechanical transmission devices and describe how each operates. • Define mechanical advantage and give an example. • Recognize the difference between ideal mechanical advantage (IMA) and actual mechanical advantage (AMA).	EPTT	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)
Standard 6. The student will understand the operation of the Internal Combustion Engine (ICE).		
Benchmark 6.1 The student will explain the operation of the 4 stroke engine. <u>Sample performance indicators:</u> • Describe the operating principles of the engine. • Explain the four-stroke cycle and the function of each of the four strokes. • Describe the coordination and operation of the valve train. • Explain the operation of the camshaft.	SE	MA12.2.5 (1) LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)
Benchmark 6.2 The student will explain the operation of the 2 stroke engine. <u>Sample performance indicators:</u> • Describe the operating principles of the engine. • Explain the four-stroke cycle and the function of each of the four strokes. • Describe the coordination and operation of the valve train. • Explain the operation of the camshaft. • Complete work order and prepare the car for deliver to customer.	SE	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)
Standard 7. Students will be able to understand sub-systems of the small engine.		

Benchmark 7.1 The student will identify and service the following sub-systems ignition, fuel, electrical, cooling, lubrication, starting, and charging. <u>Sample performance indicators:</u> • List the major components of the fuel system. • List and describe the properties of gasoline related to engine performance. • Describe the operation of the fuel delivery system. • List the various types of electrical components. • List the major components of the electrical system. • List the precautions when working with the electrical system. • Describe the importance of the battery and its maintenance. • List the starting system components and describe their functions and maintenance. • List the charging system components and describe their functions and maintenance. • List the ignition system components and describe their functions and maintenance. • Describe the various other electrical devices found in the automobile. • Explain the basic operation of the computer and the devices it can control. • List the components and describe the function of the lubrication system. • List the safety precautions for lubrication system maintenance. • Describe the properties to look for in oil. • List some common problems that could occur in the lubrication system. • List the components and describe the function of the cooling system. • List the safety precautions for cooling system maintenance. • Describe the basic maintenance for the cooling system. • Describe the different types of coolant available. • List some common problems that could occur in the cooling system.	SE	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)
Standard 8. Students will understand the ownership and operation of the automobile.		
Benchmark 8.1The student will demonstrate the routine maintenance of the automobile. <u>Sample performance indicators:</u> • Explain the benefits of maintenance. • Explain the importance of keeping a maintenance logbook. • List and explain the additional maintenance concerns for cold weather. • List and explain the additional maintenance concerns for hot weather. • List environmental concerns affecting maintenance.	TCC	LA12.1.5.b (1) LA12.1.6.d (1) LA12.1.6.f (1) LA12.2.2.c (1)

• List the types of driving and how they affect the maintenance needs of the vehicle. • List maintenance items and regular maintenance intervals. • List the steps for changing oil. • List the steps for changing the air filter. • Describe the maintenance needed for tires. • Describe how to check brakes. • Explain how to flush the cooling system. • Describe the maintenance needed for the ignition system. • Describe how to change the automatic transmission fluid. • List the steps for interior and exterior care.		

Reference Standards Sources

- KS = Career Clusters Knowledge and Skills Statements. Revised 2008. National Career and Technical Education Foundation, Silver Spring, MD. www.careerclusters.org.
- NATEF = National Automotive Technician Education Foundation 2008 Task List
- MSDS = Material Safety Data Sheet
- OSHA = Occupational Safety and Health Administration
- EPA = Environmental Protection Agency
- TRC = Transportation Research Center
- TCC = The Car Care Book by Ron Haefner
- ATGST = Automotive Technology General Service Technician
- NCTM = Nebraska Council Teaching Math
- SE = Small Engines by R. Bruce Radcliff
- EPTT = Energy, Power, and Transportation

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Other Information

Suggestions for innovative teaching and learning strategies:	•
Related assessments:	• NATEF
Extended learning opportunities:	• SkillsUSA Automotive Maintenance Technology competition