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. Target Grades 10-11.

Course Code: 101620

Program(s) of Study to which This Course Applies

- Mobile Equipment Maintenance

Course Framework	Reference Standards	Academic Crosswalk to Common Core Standards	Academic Crosswalk to Nebraska Standards	Comments
Standard 1. Students will explore and present information on a selected career in the Automotive or Mobile Equipment Repair Industry.	Performance Indicators based on Objectives from "The Car Care Book"			
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.		ELA.WHST.11-12.7-9	LA.12.4.1.a-c LA.12.1.6.j	The depth of students' investigations, and thus the research standards that apply, will be determined by the nature of the task. (CC: ELA.WHST.11-12.7-9; NE: LA.12.4.1.a-c; LA.1.6.j).
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	ELA.WHST.11-12.7-9	LA.12.4.1.a-c LA.12.1.6.j	The depth of students' investigations, and thus the research standards that apply, will be determined by the nature of the task. (CC: ELA.WHST.11-12.7-9; NE: LA.12.4.1.a-c; LA.1.6.j).

• Job shadow a career of interest. • Visit colleges of interest.				
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. Sample performance indicators: • Practice wearing safety gear. • Adhere to MSDS guidelines.	OSHA, MSDS	ELA.RST.11-12.3 ELA.RST.11-12.7 ELA.WHST.11-12.9	LA.12.3.2 LA.12.1.6.k LA.12.1.6.f LA.12.1.5.e	Alignment presumes that students must comprehend oral or written instructions to complete the task. (CC: ELA.RST.11-12.3; NE: LA.12.3.2, LA.12.1.6.k).
Benchmark 2.2 The student will follow all safety procedures while operating tools and equipment. Sample performance indicators: • Practice safe use of tools and equipment. • Comply with environment regulations and disposal.	OSHA, MSDS EPA	ELA.RST.11-12.3	LA.12.3.2 LA.12.1.6.k	Alignment presumes that students must comprehend oral or written instructions to complete the task. (CC: ELA.RST.11-12.3; NE: LA.12.3.2, LA.12.1.6.k).
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. Sample performance indicators: • Perform measurements with various measuring tools. • Describe the basic for each measurement system.	ATGST NCTM	N/A	MA.12.2.5.b	Alignment presumes that students will demonstrate their understanding of USC and metric measurement systems by solving problems involving measurement (NE: MA.12.2.5.b).
Benchmark 3.2 The student will demonstrate the use of the tools and equipment safely. Sample performance indicators: • Employ basic electrical safety in lab.		ELA.RST.11-12.3	LA.12.3.2 LA.12.1.6.k	Alignment presumes that students must comprehend oral or written instructions to complete the task. (CC: ELA.RST.11-12.3; NE: LA.12.3.2, LA.12.1.6.k).

• Demonstrate the proper handling of hazard materials. • Describe the use of fire extinguisher and safety equipment. • Demonstrate the safety precautions 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.		ELA.RST.11-12.4	LA.12.1.5.a.	
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> • List the different types of land, air, and sea transportation.		ELA.WHST.11-12.7-9	LA.12.4.1.a-c LA.12.1.6.j	The depth of students' investigations, and thus the research standards that apply, will be determined by the nature of the task. (CC: ELA.WHST.11-12.7-9; NE: LA.12.4.1.a-c; LA.1.6.j).
Standard 5. Students will identify and distinguish the forms of energy and power transmission.				
Benchmark 5.1 The student will recognize solar, wind, nuclear, hydro, geothermal, biomass, bio-fuel, and fossil fuels. <u>Sample performance indicators:</u> • Cost effective. • Application possibilities.		ELA.RST.11-12.4	LA.12.1.5.a. SC.12.4.3.c	Alignment presumes that students will evaluate renewable energy resources (NE: SC.12.4.3.c).
Benchmark 5.2 The students will understand how the power transmission. <u>Sample performance indicators:</u>				

Standard 6. Students will understand the operation of the Internal Combustion Engine (ICE).				
Benchmark 6.1 The student will explain the operation of the 4 stroke engine. Sample performance indicators: • 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.		ELA.WHST.11-12.2.b ELA.SL.11-12.4	LA.12.2.1.b LA.12.3.1.a	When students *explain* information or ideas, they communicate their knowledge through either speaking or writing. To demonstrate full knowledge on the topic, student' presentations must include all the main ideas and relevant details on the subject. (CC: ELA.WHST.11-12.2.b, ELA.SL.11-12.4; NE: LA.12 .2.1.b, LA.12.3.1.a)
Benchmark 6.2 The student will explain the operation of the 2 stroke engine. Sample performance indicators: • 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.		ELA.WHST.11-12.2.b ELA.SL.11-12.4	LA.12.2.1.b LA.12.3.1.a	When students *explain* information or ideas, they communicate their knowledge through either speaking or writing. To demonstrate full knowledge on the topic, student' presentations must include all the main ideas and relevant details on the subject. (CC: ELA.WHST.11-12.2.b, ELA.SL.11-12.4; NE: LA.12. 2.1.b, LA.12.3.1.a)
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. Sample performance indicators: • List the major components of the fuel system. • List and describe the properties of gasoline related to engine performance.		ELA.RST.11-12.4	LA.12.1.5.a. SC.12.2.1.d SC.12.2.3.f	Alignment presumes that students will describe the properties of fuel and learn about electromagnetic waves as it relates to electrical systems. (NE: SC.12.2.3.f).

• 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.				
Standard 8. Students will understand the ownership and operation of the automobile.				
Benchmark 8.1 The 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.		ELA.RST.11-12.3	LA.12.3.2 LA.12.1.6.k SC.12.2.1.b	Alignment presumes that students must comprehend oral or written instructions to complete the task. (CC: ELA.RST.11-12.3; NE: LA.12.3.2, LA.12.1.6.k). Alignment presumes that students will investigate changes in states of matter as it relates to concerns about hot and cold weather

• 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.				(NE: SC.12.2.1.b).

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
- The Car Care Book by Ron Haefner
- ATGST = Automotive Technology General Service Technician
- NCTM = Nebraska Council Teaching Math

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Other Information

Suggestions for innovative teaching and learning	•

strategies:	
Related assessments:	•
Extended learning opportunities:	• SkillsUSA Automotive Service Technology competition