



Course Outcome Summary

Course Information: **Basic Maintenance**

Description: This course is for those looking to enter the automotive industry as an entry level technician. The course covers the diagnosis, maintenance and repair of the heating and cooling systems, steering and suspension, engine lubrication, tires and wheel balancing, transmission servicing, vehicle safety, service and shop management and parts distribution. Automotive shop safety practices are also stressed.

Instruction Level: Grades 11-12
Total Credits: 1

Course Standards:

ACT College and Career Readiness Standards

- Show competent use of language to communicate ideas
- Locate and interpret minor or subtly stated details in complex passages
- Analyze and draw conclusions based on a set of conditions
- Interpret words and phrases as they are used in complex passages, including determining technical, connotative, and figurative meanings
- Draw logical conclusions using information from two informational texts

CTE Common Core Standards

- Students will communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.
- Students will identify and apply employability skills
- Students will assess the benefits and challenges of working in diverse settings and on diverse teams
- Students will apply leadership skills in real-world, family, community and business and industry applications.

Career and Technology Standards

- Identify how governmental regulations and technological trade-offs might influence the transportation modes used to move people and goods from one place to another.
- Recognize that transportation vehicles need to be cared for in order to prolong their useful life.
- Explain that transportation vehicles have multiple components with different functions.
- Predict how a lack of maintenance can lead to degradation and premature failure.

- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Explain that all systems demand specific repair procedures in order to achieve highest performance and efficiency.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.
- Explain career preparation, career pathways and the importance of on-the-job training as well as further education with regard to the transportation field.

Unit

1. **Visual Inspections**
2. **Cooling Systems**
3. **Lubrication Systems**
4. **Tires and Balancing**
5. **Steering and Suspension**
6. **Automatic and Manual Drive Systems**

Unit Outlines

1. Visual Inspections

Standards:

- Identify how governmental regulations and technological trade-offs might influence the transportation modes used to move people and goods from one place to another.
- Recognize that transportation vehicles need to be cared for in order to prolong their useful life.
- Explain that transportation vehicles have multiple components with different functions.

Essential Question:

Students will be able to answer the question(s):

- What role does accurate repair and maintenance records play in efficient and timely repairs?
- What role does accurate repair and maintenance records play in preserving the value of a vehicle?

Essential Knowledge:

- Understand the role clear written communication plays in an automotive repair shop.
- Complete a specification sheet for their family vehicle.
- Complete an under-hood inspection sheet.

- Complete an under-lift inspection sheet.

2. Cooling Systems

Standards:

- Predict how a lack of maintenance can lead to degradation and premature failure.
- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.

Essential Question:

Students will be able to answer the question(s):

- Why is the cooling system essential to the automotive vehicle?
- What preventative maintenance procedures will extend the life of the cooling system?
- What are clues to a failing cooling system?

Essential Knowledge:

- Identify and understand the function of a cooling system and its components: radiator, water pump, thermostat, fan, hoses, clamps and heater core.
- Understand why the cooling system is essential to vehicle operation.
- Know the clues to a failing cooling system.
- Test the viscosity of coolant.
- Pressure tests a cooling system.

3. Lubrication Systems

Standards:

- Predict how a lack of maintenance can lead to degradation and premature failure.
- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.

Essential Question:

Students will be able to answer the question(s):

- What role does accurate repair and maintenance records play in efficient and timely repairs?
- What role does accurate repair and maintenance records play in preserving the value of a used vehicle?

Essential Knowledge:

- Locate external engine components on multiple vehicles.
- Remove wheels to rotate tires, inspect suspension components and evaluate brakes.
- Use a torque wrench to tighten lug nuts accurately.
- Replace windshield wipers.
- Check and top off vital fluids.
- Change oil and filter.

4. Tires and Balancing

Standards:

- Predict how a lack of maintenance can lead to degradation and premature failure.
- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.

Essential Question:

Students will be able to answer the question(s):

- How do tires affect safety and performance?

Essential Knowledge:

- Know how friction contributes to vehicle performance in varying weather conditions.
- Know the criteria for an excellent tire.
- Inspect tires, adjust pressure, rotate tires for even wear, and understand uni-directional configuration.
- Understand how tires affect vehicle performance.
- Understand how tires affect driving safety.
- Understand tire sidewall information.
- Describe the process for diagnosing and servicing wheels and tires.
- Understand the Tire Pressure Monitor System (TPMS).
- Identify a direct TPMS valve.
- Identify where accurate information concerning tire pressure can be located.

5. Steering and Suspension

Standards:

- Predict how a lack of maintenance can lead to degradation and premature failure.
- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.

Essential Question:

Students will be able to answer the question(s):

- What essential components of a suspension system need to be inspected and maintained for safe operation?
- How does skid control, also known as Dynamic Vehicle Stability, improve crash survivability?
- How do the suspension and steering systems affect vehicle safety?

Essential Knowledge:

- Identify and understand the major components of the steering and suspension system: shocks, anti-sway bars, bushings, springs, tie rod ends, and airbag clock spring.
- Identify and describe the function of the components that make up the steering system.
- Identify and describe operation of suspension system components.
- Describe principles of wheel alignment.

6. Automatic and Manual Drive Systems

Standards:

- Predict how a lack of maintenance can lead to degradation and premature failure.
- Identify that a transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not properly working.
- Interpret preventive maintenance schedules and recommended service intervals for vehicles.
- Operate transportation-related tools and equipment in a safe manner.
- Students will perform tasks related directly to current national standards per transportation area (i.e., NATEF).
- Demonstrate safe and proficient use of specialty tools and equipment related to servicing transportation vehicles.

Essential Question:

Students will be able to answer the question(s):

- What is the function of the transmission?
- What are the differences between manual and automatic transmissions?

Essential Knowledge:

- Understand basic theory of manual transmission operation
- Know the four main components of the clutch system
- Understand the basic procedure for clutch replacement
- Understand the importance of hydraulics as related to clutch operation
- Be able to check fluid level of manual transmission
- Understand the relationship between gears and torque multiplication
- Know the difference between a transmission and a transaxle
- Understand basic theory of automatic transmission operation
- Perform a fluid level check on an automatic transmission
- Understand the connection between a spinning torque converter and automatic transmission fluid level
- Understand the basic operation of a Continuously Variable Transmission (CVT)
- Understand the purpose of universal joints and Constant-Velocity (CV) joints
- Inspect CV joints: estimate cost of professional repair
- Inspect universal joints
- Perform preventive maintenance using a grease gun
- Know the purpose of a differential
- Know the purpose of a transfer case
- Be able to perform a fluid check on a differential
- Be able to perform a fluid check on a transfer case
- Be able to calculate gear ratio given information on crown and pinion gears
- Understand advantages/disadvantages of front drive/rear drive in regard to oversteer and understeer
- Understand differences between all-wheel drive, part time four wheel drive and four wheel drive