FUNDAMENTALS OF AUTOMOTIVE SERVICE (NATEF aligned)
Course Syllabus

Course Number: ATOS-1609
OCAS Code: None
Course Length: 45 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Automotive Service
Career Major(s): Automotive General Service Technician (NATEF Compliant), Maintenance Light Repair Technician (NATEF Compliant)

Pre-requisite(s):
This course covers occupational health and safety and tools and equipment identification, usage and operation. The student will learn about the history, current state and future of the automotive service industry. This course will cover dealership and independent operations. The student will learn vehicle identification and how to look up service information using several different sources. The student will learn vehicle maintenance, which will include fluid level checks and adjustments, peripheral electrical system checks and tire inspection and air pressure adjustment. In this course the student will learn basic measuring instruments used in vehicle service and diagnosis, as well as communication skills used throughout the automotive service industry.


Course Objectives:

A. Complete Introduction to Automotive Service.
1. Complete administration forms and requirements for enrollment.
2. Discuss program completion/competency certificates.
3. Describe ASE certification requirements and the importance of NATEF.
4. Discuss district, school, and class policies and procedures.
5. Discuss grading criteria.
6. Participate in CTSO activities.
7. Complete PDP assignments.
8. Complete related math activities.
9. Complete related reading activities.
10. Demonstrate basic computer literacy.
11. Discuss the history and current state of the automotive industry.
12. Identify some future trends in the auto industry.
13. List career opportunities in the automotive field.
14. Compare dealership and independent auto service operations.
15. Practice communications skills used in the automotive industry.

B. Demonstrate Knowledge of Safety Practices
1. Review the role of OSHA and EPA.
2. Locate MSDS sheets in classroom and review parts and terms.
3. Discuss types and location of fire extinguishers.
4. Demonstrate proper lifting methods.
5. Explain the need for proper clothing for a safe working environment.
6. Explain the proper steps in reporting an accident.
7. List personal safety rules and accident prevention.
8. Review current laws concerning "hazardous waste management" as it relates to your industry.
10. Pass safety test with 100% accuracy.

C. Use Automotive Tools and Equipment
   1. Identify basic tools.
   2. Demonstrate proper usage of hand and power tools.
   3. Demonstrate the safe use of compressed air.
   4. Demonstrate safe usage of power tools.
   5. Demonstrate safe use of jacks, lifts (hoists), and jackstands.
   6. Identify various other pieces of equipment found in an automotive shop.
   7. Match specialty tools with the type of jobs they are designed to do.
   8. Safely demonstrate proper usage of equipment.
   9. Use basic measuring instruments to make accurate measurements.
   10. Convert measurements from standard to metric.
   11. Identify and use various automotive nuts, bolts, fasteners, sealants and gaskets.
   12. Use other measuring devices, such as a feeler gauge, micrometer, dial indicator, dial/vernier caliper, thermometer (Fahrenheit and Centigrade), hydrometer, torque wrenches and a tire pressure gauge.
   13. Describe different types of part cleaning machines.
   14. Demonstrate the safe use of a part cleaning machine.
   15. Identify electrical test instruments used in the shop.
   16. Demonstrate the safe use of hand-held electrical test instruments.
   17. Discuss how to hook up diagnostic machines and what tests they perform.

D. Demonstrate Knowledge of Fasteners and Gaskets
   1. Explain the difference between screws and bolts.
   2. Identify nuts found on automobiles.
   3. Describe nonthreaded fasteners used on cars.
   4. Discuss types and applications of various automotive gaskets.
   5. Describe the purposes of seals used on automobiles.
   6. Explain how bolts, nuts, screws, and studs are marked to indicate their strength.
   7. Describe the different methods of repairing threads.
   8. Select and measure a bolt.
   9. Drill and tap a hole.
   10. Use easy-out to remove a broken bolt.
   11. Explain how metric threads differ from USCS threads.
   12. Install a heli-coil.
   13. Discuss what is meant by "torque requirements" for threaded fasteners.
   14. Explain proper use of sealants, anti-seize compounds, and adhesives.
   15. Explain the purpose and designs of automotive gaskets.
   16. Demonstrate steps used to replace a gasket.

E. Complete Customer Repair Orders and Use Resources
   1. Practice writing legible, accurate repair orders.
   2. Find the vehicle identification number (VIN) on a vehicle and discuss what it tells you.
   3. Look up service information on vehicles using several different sources.
4. Use Mitchell-on-Demand and any other electronic manuals available for specifications and repair procedures.
5. Find specific information in service (shop) manuals and service bulletins.
6. Use a flat rate manual to determine time and cost of repairs.
7. Use conversion charts and specification tables to determine proper operation of components.
8. Use auto parts catalog to reference and order parts.
9. Discuss the value of trade journals and magazines.

F. Perform Basic Vehicle Maintenance
1. Identify the major systems of an automobile and briefly explain the purpose of each.
2. Match various automotive systems with the components of which they are comprised.
3. Perform basic fluid level checks and adjustments.
4. Practice peripheral electrical system checks.
5. Perform tire inspection and air pressure adjustments.

G. Automotive Fundamentals and Principles
1. Define terms related to automotive engines.
2. Discuss how an automobile engine produces power.
3. Classify automotive engines according to specific characteristics.
4. Explain the four-stroke cycle used in automotive engines.
5. Make measurements and determine an engine's displacement.
6. Calculate the compression ratio of an engine.
7. Explain the relationships of different types of horsepower ratings.
8. Calculate the efficiency of an engine.
9. Explain how cylinder blocks and crankshafts are made.
10. Discuss how crankshaft design determines engine firing order.
11. Identify the main parts of a crankshaft.
12. Explain the operation of the camshaft.
13. Describe characteristics of engine bearings.
14. Identify and give the purposes of pistons, rings, and connecting rods.
15. Describe overhead camshaft and pushrod type valve trains and give advantages/disadvantages of each.
16. Identify and describe the functions of valves, valve guides, and lifters.

H. Induction and Exhaust Systems
1. Identify and describe modern exhaust system components and their function.
2. List devices used to lessen harmful exhaust gas emissions, and discuss the purpose of each.
3. Explain how muffler design reduces noise of the exhaust system.
4. Discuss why exhaust leaks are dangerous.
5. Identify and describe modern induction systems including turbocharger and supercharger.
6. Inspect induction system for leaks.
7. Inspect exhaust system for leaks.

I. Lubrication System
1. Discuss the functions of oil and other lubricants in an engine.
2. List common additives used in engine oils.
3. Identify the SAE viscosity and API service ratings for oils.
4. Name the parts of an engine lubrication system and discuss the function of
J. Cooling System
1. Describe how heat is transferred away from the combustion chamber.
2. Identify the components of the cooling system and discuss the purpose of each.
3. Explain why an antifreeze/water coolant mixture must be used in the cooling system.
4. Check coolant mixture strength using a hydrometer.
5. Describe how the radiator pressure cap helps to prevent boiling.
6. Inspect and replace engine cooling and heater system hoses.
7. Inspect, test, and replace thermostat, by-pass, and housing.
8. Discuss coolant recycling equipment.
9. Adjust fan belts to proper tension using approved procedures.

K. Fuel System
1. Discuss characteristics of gasoline.
2. Describe the causes of abnormal combustion of fuels.
3. Visually identify the parts of a basic fuel system on a vehicle.
4. Describe the function of the fuel system components.
5. Compare carburetor and fuel injection systems.
6. Disassemble fuel system and identify circuits fuel flow.
7. Explain basic differences between diesel fuel and gasoline.

L. Drivelines
1. Discuss how the driveline operates.
2. Identify and describe the parts of a driveline.
3. Compare universal joints and constant-velocity joints.
4. Inspect and lubricate a driveline.

M. Transmissions/Transaxles/Clutches
1. Explain how gears are used to increase or decrease torque and speed.
2. Identify and describe the components of a manual transmission and transaxle.
3. Follow the flow of power through transmission gears.
4. Describe the construction and operation of a clutch.
5. Discuss qualities of automatic transmission fluid.
6. Inspect an automatic transmission for proper fluid level and condition.
7. Adjust transmission fluid levels to manufacturer’s requirements.

N. Differentials
1. Describe how a differential operates.
2. List types of driving axles.
3. Remove driving axles from C-lock and retainer-type axles on mock-ups.

O. Suspension and Steering Systems
1. Discuss the function of the suspension system.
2. Explain the function and operation of a shock absorber.
3. Identify the parts of a steering system on a vehicle and state the purpose of each.
4. Lubricate an automotive chassis.
5. Discuss rack and pinion steering.
6. Define front end geometry angles.
7. Check steering lubricant level; service to proper level.
8. Inspect steering system for loose or worn parts.
9. Inspect a suspension system for loose or worn parts.

P. Tires and Wheels
1. Discuss tire construction and types of tires.
2. Explain information included in tire size coding.
3. Check tires for correct pressure and adjust if needed.
4. Use tire machine to break down and mount tires on wheels.
5. Measure lateral and radial run-out of tires and wheels.
6. Balance a wheel and tire.

Q. Brake Systems
1. Explain how friction is used to stop a vehicle.
2. Identify the components of a basic brake system and discuss the purpose of each.
3. Compare drum and disc brake systems.
4. Remove and replace brake pads and shoes on mock ups.
5. Adjust brake shoes to manufacturer’s specifications.
6. Discuss purpose and types of parking brakes.

R. Heating and Air Conditioning Systems
1. Locate heating system components on a vehicle.
2. Discuss the function of each heating system component.
3. Identify components of an air conditioning system.
4. List special handling procedures for automotive refrigerants.
5. Inspect pulleys for serviceability.
6. Adjust belts to proper tension.

S. Safety and Security Systems
1. Describe devices that contribute to automotive passenger safety.
2. Discuss automobile design features that contribute to passenger safety.
3. Identify the components of an active restraint system.
4. Identify the components of a passive restraint system.
5. Differentiate between active and passive restraint systems.
6. Discuss security and antitheft devices.

Objectives are TTC instructor developed.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures:
1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.
### Description of Classroom, Laboratories, and Equipment:

Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

### Available Certifications/College Credit

The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee, Rogers State University or Tulsa Community College. See program counselor for additional information.

### College Credit Eligibility:

1. The student must maintain a grade point average of seventy (70%) percent or better.
2. The student must maintain an attendance record of ninety (90%) or better.