New Horizons
REGIONAL EDUCATION CENTERS
Course Syllabus

Course Name: Automotive Technology I

Instructor Name: Mr. Tim Fary

Contact Information:

Office Phone: 757-766-1100 Ext. 3372 (Classroom), 3375 (Shop)

E-mail Address: timothy.fary@nhrec.org

Class Website: N/A

Office Location: D14

Shop Location: D20

Office Hours: 2:45 p.m.-3:00 p.m.

Methods of Instruction: Lecture, Hands-on lab work, Interactive web based instruction.

Course Description: This program is NATEF certified and offers dealership employment opportunities for students who qualify and are selected during the spring semester of the first year. Our program also ensures that students have ASE certified instructors, service equipment, and current model cars so students receive quality instruction using the latest technology. Automotive manufacturers and local dealerships sponsor the Automotive Youth Education System at New Horizons. Students who are selected for Summer Mentorship opportunities receive hands-on training in service departments of sponsoring dealers under the supervision of experienced technicians.

Course Textbook: Modern Automotive Technology 9th ed. (provided by NHREC) Authors: James E. Duffy Copyright 2014 Publisher: Goodheart-Wilcox

Course Workbook: Modern Automotive Technology (purchased by student)

Course Objectives: Auto Technology I is the initial phase of a two-year program that prepares students to become entry-level auto technicians.

Chronology of Course: **1st Marking Period**: General school rules and regulations; Hand and power tools; Wheels and tires; **2nd Marking Period:** Steering and suspension; Brake systems; **3rd Marking Period:** Engine service and repair; **4th Marking Period:** Manual and automatic drive transmission and transaxle service.

Course Requirements: Dickies dark blue button-down shirt, Dickies dark blue pants (coveralls are **not** acceptable), Black belt, three inch 3-ring binder, Oil resistant shoes (steel toe recommended), a lock for your shop locker, safety glasses, No. 2 pencils with eraser, mechanics gloves (optional), notebook paper **Grading/Evaluation Procedures:**

Grading Scale: Ten point

Evaluation methods: Written assessments-33%, Hands-on Competencies-33%, Employability Skills assessments-34%

Late work/Make-up work policy: All missed assignments must be completed by the assignment due date. Assignment grades will be reduced 2 points for each day late. After two weeks a zero will be given.

Attendance Policy: Five or more unexcused absences within a marking period will result in a grade of "F"

Student Organizations: AYES - Automotive Youth Education System, Hampton Roads Public Works Academy (HRPWA), Skills USA

Credentialing/Licensing: Student ASE

Class Fees: Student workbook- $30.00; Skills USA dues- $17.00 **Total =$47.00**

Clinical or Practical Experiences: Job Shadowing; AYES Summer mentorship program, OJT(On-the-job) training program,

Dual Enrollment: Eligible

Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.

The following NATEF tasks will be accomplished:
Semester 1:

Shop and Personal Safety

-Identify general shop safety rules and procedures.
-Utilize safe procedures for handling of tools and equipment.
-Identify and use proper placement of floor jacks and jack stands.
-Utilize proper ventilation procedures for working within the lab/shop area.
-Identify and use proper procedures for safe lift operation.
-Identify marked safety areas.
-Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate -knowledge of the procedures for using fire extinguishers and other fire safety equipment.
-Identify the location and use of eye wash stations.
-Identify the location of the posted evacuation routes.
-Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
-Identify and wear appropriate clothing for lab/shop activities.
-Secure hair and jewelry for lab/shop activities.
-Demonstrate an awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
-Demonstrate an awareness of the safety aspects of high voltage circuits (such as high intensity discharge
(HID) lamps, ignition systems, injection systems, etc.).
-Locate and demonstrate knowledge of material safety data sheets (MSDS).

Tools and Equipment

-Identify tools and their usage in automotive applications.
-Identify standard and metric designation.
-Demonstrate safe handling and use of appropriate tools.
-Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
-Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).

Preparing Vehicle for Service
-Identify information needed and the service requested on a repair order.
-Identify purpose and demonstrate proper use of fender covers, mats.
-Demonstrate the use of the three C's (concern, cause, and correction).
-Review vehicle service history.
-Complete work order to include customer information, vehicle identifying information, and customer concern, related service history, cause, and correction.

Preparing Vehicle for Customer

-Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).

BRAKES

-Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
-Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
-Install wheel and torque lug nuts.
-Measure brake pedal height, travel, and free play (as applicable); determine necessary action.
-Check master cylinder for external leaks and proper operation.
-Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action.
-Identify components of brake warning light system.
-Select, handle, store, and fill brake fluids to proper level.
-Bleed and/or flush brake system.
-Test brake fluid for contamination.
-Remove, clean, inspect, and measure brake drum diameter; determine necessary action.
-Refinish brake drum and measure final drum diameter; compare with specifications.
-Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. -Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.
-Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.
-Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.
-Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.
-Remove, inspect, and replace pads and retaining hardware; determine necessary action.
-Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.
-Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
-Remove and reinstall rotor.
-Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.
-Retract and re-adjust caliper piston on an integral parking brake system.
-Check brake pad wear indicator; determine necessary action.
-Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.
-Check brake pedal travel with, and without, engine running to verify proper power booster operation.
-Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
-Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.
-Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.
-Check parking brake operation and parking brake indicator light system operation; determine necessary action.
-Check operation of brake stop light system.
-Replace wheel bearing and race.
-Inspect and replace wheel studs.
-Identify traction control/vehicle stability control system components.

-Describe the operation of a regenerative braking system.

SUSPENSION AND STEERING SYSTEMS

-Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
-Disable and enable supplemental restraint system (SRS).
-Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
-Determine proper power steering fluid type; inspect fluid level and condition.
-Flush, fill, and bleed power steering system.
-Inspect for power steering fluid leakage; determine necessary action.
-Remove, inspect, replace, and adjust power steering pump drive belt.
-Inspect and replace power steering hoses and fittings.
- Inspect pitman arm, relay (center link/intermediate) rod, idler arm and mountings, and steering linkage damper.
-Inspect tie rod ends (sockets), tie rod sleeves, and clamps.
-Inspect upper and lower control arms, bushings, and shafts.
-Inspect and replace rebound and jounce bumpers.
-Inspect track bar, strut rods/radius arms, and related mounts and bushings.
-Inspect upper and lower ball joints (with or without wear indicators).
-Inspect suspension system coil springs and spring insulators (silencers).
-Inspect suspension system torsion bars and mounts.
-Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.
-Inspect strut cartridge or assembly.
-Inspect front strut bearing and mount.
-Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.
-Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.
-Inspect, remove, and replace shock absorbers; inspect mounts and bushings.
-Inspect electric power-assisted steering.
-Identify hybrid vehicle power steering system electrical circuits and safety precautions.
-Describe the function of the power steering pressure switch.
-Perform pre-alignment inspection and measure vehicle ride height; determine necessary action. -Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure; determine necessary action.
-Rotate tires according to manufacturer's recommendations.
-Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic). -Dismount, inspect, and remount the tire on a wheel equipped with a tire pressure monitoring system sensor.
-Inspect tire and wheel assembly for air loss; perform necessary action.
-Repair tire using internal patch.
-Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.
-Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.

Semester 2:

ENGINE REPAIR:

-Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
-Verify operation of the instrument panel engine warning indicators.
-Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
-Install engine covers using gaskets, seals, and sealers as required.
-Remove and replace timing belt; verify correct camshaft timing.
-Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
-Identify hybrid vehicle internal combustion engine service precautions.
-Adjust valves (mechanical or hydraulic lifters).
-Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core and galley plugs; determine necessary action.
-Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
-Remove, inspect, and replace thermostat and gasket/seal.
-Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. - Perform engine oil and filter change.

MANUAL DRIVETRAIN AND AXLES

-Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins.
-Drain and refill manual transmission/transaxle and final drive unit.
-Check fluid condition; check for leaks.
-Check and adjust clutch master cylinder fluid level.
-Check for system leaks
-Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.
-Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals.
-Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.
-Clean and inspect differential housing; check for leaks; inspect housing vent.
-Check and adjust differential housing fluid level.
-Drain and refill differential housing.
-Inspect and replace drive axle wheel studs.
-Inspect front-wheel bearings and locking hubs.
-Check for leaks at drive assembly seals; check vents; check lube level.