



Waldo County Technical Center

Automotive Technology I

Syllabus

Class Description

During this class will focus on the maintenance and light repair of modern automobiles. This course will introduce students to automotive service and repair. Additionally, students will inspect vehicles and preform basic maintenance and light repair work, with the help of service information. The class will be a mixture of online and classroom learning, mixed with hands on skills in the shop area. The focus of these skills will be the NATEF maintenance and light repair task list. Students will learn to work in a shop environment and use industry equipment, SAFETY will be the number one priority.

Module Objectives

After completing this course, the student will be familiar with all tasks listed below. He or she must perform all high priority tasks to manufacturer’s specifications and document the completion of each task.

NATEF Tasks for This Module

For every task in Maintenance and Light Repair , the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

➤ **SUSPENSION AND STEERING**

For every task in Suspension and Steering, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

IV. SUSPENSION AND STEERING SYSTEMS

A. General

- 1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
- 2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation. P-1
- 3. Identify suspension and steering system components and configurations. P-1

IV. SUSPENSION AND STEERING

B. Related Suspension and Steering Service

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|--|-----|
| 1. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. | P-1 |
| 2. Inspect power steering fluid level and condition. | P-1 |
| 3. Flush, fill, and bleed power steering system; use proper fluid type per manufacturer specification. | P-2 |
| 4. Inspect for power steering fluid leakage. | P-1 |
| 5. Remove, inspect, replace, and/or adjust power steering pump drive belt. | P-1 |
| 6. Inspect and replace power steering hoses and fittings. | P-2 |
| 7. Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm, mountings, and steering linkage damper. | P-1 |
| 8. Inspect tie rod ends (sockets), tie rod sleeves, and clamps. | P-1 |
| 9. Inspect upper and lower control arms, bushings, and shafts. | P-1 |
| 10. Inspect and replace rebound bumpers. | P-1 |
| 11. Inspect track bar, strut rods/radius arms, and related mounts and bushings. | P-1 |
| 12. Inspect upper and lower ball joints (with or without wear indicators). | P-1 |
| 13. Inspect suspension system coil springs and spring insulators (silencers). | P-1 |
| 14. Inspect suspension system torsion bars and mounts. | P-1 |
| 15. Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links. | P-1 |
| 16. Inspect, remove, and/or replace strut cartridge or assembly; inspect mounts and bushings. | P-2 |
| 17. Inspect front strut bearing and mount. | P-1 |
| 18. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms. | P-1 |
| 19. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. | P-1 |
| 20. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. | P-1 |
| 21. Inspect electric power steering assist system. | P-2 |
| 22. Identify hybrid vehicle power steering system electrical circuits and safety precautions. | P-2 |
| 23. Describe the function of suspension and steering control systems and components, (i.e. active suspension, and stability control). | P-3 |

IV. SUSPENSION AND STEERING

C. Wheel Alignment

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|--|-----|
| 1. Perform prealignment inspection; measure vehicle ride height. | P-1 |
| 2. Describe alignment angles (camber, caster and toe) | P-1 |

IV. SUSPENSION AND STEERING

D. Wheels and Tires

1. Inspect tire condition; identify tire wear patterns; check for correct tire size, application (load and speed ratings), and air pressure as listed on the tire information placard/label. P-1
2. Rotate tires according to manufacturer's recommendations including vehicles equipped with tire pressure monitoring systems (TPMS). P-1
3. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. P-1
4. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor. P-1
5. Inspect tire and wheel assembly for air loss; determine necessary action. P-1
6. Repair tire following vehicle manufacturer approved procedure. P-1
7. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate system; verify operation of instrument panel lamps. P-1
8. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system (TPMS) including relearn procedure. P-1

➤ BRAKES

For every task in Brakes, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

V. BRAKES

A. General

1. Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). P-1
3. Install wheel and torque lug nuts. P-1
4. Identify brake system components and configuration. P-1

V. BRAKES

B. Hydraulic System

1. Describe proper brake pedal height, travel, and feel. P-1
2. Check master cylinder for external leaks and proper operation. P-1
3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports. P-1

4. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. P-1
5. Identify components of hydraulic brake warning light system. P-3
6. Bleed and/or flush brake system. P-1
7. Test brake fluid for contamination. P-1

V. BRAKES

C. Drum Brakes

1. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. P-1
2. Refinish brake drum and measure final drum diameter; compare with specification. P-1
3. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1
4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. P-2
5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments. P-1

V. BRAKES

D. Disc Brakes

1. Remove and clean caliper assembly; inspect for leaks and damage/wear; determine necessary action. P-1
2. Inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. P-1
3. Remove, inspect, and/or replace brake pads and retaining hardware; determine necessary action. P-1
4. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads and inspect for leaks. P-1
5. Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout; determine necessary action. P-1
6. Remove and reinstall/replace rotor. P-1
7. Refinish rotor on vehicle; measure final rotor thickness and compare with specification. P-1
8. Refinish rotor off vehicle; measure final rotor thickness and compare with specification. P-1
9. Retract and re-adjust caliper piston on an integral parking brake system. P-2
10. Check brake pad wear indicator; determine necessary action. P-1
11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendation. P-1

V. BRAKES

E. Power-Assist Units

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation. P-2
2. Identify components of the brake power assist system (vacuum and hydraulic); check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster. P-1

V. BRAKES

F. Related Systems (i.e. Wheel Bearings, Parking Brakes, Electrical)

1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings. P-1
2. Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. P-2
3. Check parking brake operation and parking brake indicator light system operation; determine necessary action. P-1
4. Check operation of brake stop light system. P-1
5. Replace wheel bearing and race. P-2
6. Inspect and replace wheel studs. P-1

V. BRAKES

G. Electronic Brake, Traction Control, and Stability Control Systems

1. Identify traction control/vehicle stability control system components. P-3
2. Describe the operation of a regenerative braking system. P-3

➤ ENGINE REPAIR

For every task in Engine Repair, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

I. ENGINE REPAIR

A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
2. Verify operation of the instrument panel engine warning indicators. P-1
3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1
4. Install engine covers using gaskets, seals, and sealers as required. P-1
5. Verify engine mechanical timing. P-2
6. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. P-1

7. Identify service precautions related to service of the internal combustion engine of a hybrid vehicle. P-2

I. ENGINE REPAIR

B. Cylinder Head and Valve Train

1. Adjust valves (mechanical or hydraulic lifters). P-3

2. Identify components of the cylinder head and valve train. P-1

I. ENGINE REPAIR

C. Lubrication and Cooling Systems

1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action. P-1

2. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment P-1

3. Remove, inspect, and replace thermostat and gasket/seal. P-1

4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. P-1

5. Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. P-1

6. Identify components of the lubrication and cooling system P-1

➤ **HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**

For every task in Heating, Ventilation and Air Conditioning (HVAC), the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

A. General

1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins. P-1

2. Identify heating, ventilation and air conditioning (HVAC) components and configuration. P-1

VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

B. Refrigeration System Components

1. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action. P-1

2. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. P-2

3. Inspect A/C condenser for airflow restrictions; determine necessary action. P-1

VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

C. Heating, Ventilation, and Engine Cooling Systems

1. Inspect engine cooling and heater systems hoses and pipes; determine necessary action. P-1

VII. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

D. Operating Systems and Related Controls

1. Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action. P-1

2. Identify the source of A/C system odors. P-2

Topical Outline of Instruction

1. Safety and Shop Operations
2. Preventive Maintenance
3. Brakes
4. Steering and Suspension
5. Engine Repair
6. Heating, Ventilation, and Air Conditioning

Class Requirements

- Students will develop a three-ring binder/portfolio of all handouts, quizzes and tests.
- Students will successfully complete homework, quizzes and tests.
- Students will successfully complete shop projects as assigned and approved by instructor and maintain documentation of completion.
- Students will keep the shop clean and organized
- Students are required to wear proper dress while in the lab area (shorts, open toe shoes, etc. will not be permitted).
- Students must pass the Safety Exam at the beginning of the year in order to work out in the lab area.
- Students WILL wear safety glasses AT ALL TIMES in the lab area.
- Students must pass all tool safety tests with a 100% score before being allowed to use any given tools out in the shop area.
- Students must turn in all paperwork at the first of the year, signed by their parents/guardian, before participating in work in the lab.
- Students must work in a mature manner in the lab. Any horseplay will endanger the welfare of other students and is grounds for dismissal from the program.
- Students will earn a 10-hour OSHA General Industry safety certification

Entry Recommendations

- Students should have high school level math and reading skills.
- Students should have an interest in the Auto Repair Field.
- Students should be self-motivated.
- Students should have good communication skills.
- Students should be able to work together with others.

Student Evaluation and Grading

10%: Attendance and Participation

10%: Homework

20%: Quizzes

30%: Tests

30%: Practice of Safety and Shop Participation, including Portfolio

A grade of “C” or better is required to satisfactorily complete the course

Text

Online: Electude-www.meeasterncc.com

Students will be given log in information they are responsible to keep track of it to access the online classroom

Students are required to take care of the school supplied tools and equipment.

Required personal protective equipment must be worn at all times in lab. This includes work boots, and safety glasses.

Clothing should be appropriate to shop work, and be okay to get dirty/ greasy.

Office Hours

7:30-2:30 Monday-Friday

Appointments can be made to accommodate student needs.

Cell Phones

Cell phones must be set to vibrate or silence during all class periods. Students that find it necessary to accept a call during class time should do so ONLY on an emergency basis with instructor permission and should leave the classroom/lecture area to do so. Texting or any other disturbance during class times will NOT be tolerated and students will be asked to turn over the cell phone to the instructor and will be assigned a zero (0) for that period. The student can retrieve the phone at the end of the class.

Plagiarism Statement

Adherence to ethical academic standards is obligatory. Cheating is a serious offense, whether it consists of taking credit for work done by another person or doing work for which another person will receive credit. Taking and using the ideas or writings of another person without clearly and fully crediting the source is plagiarism and violates the academic code. If it is proven that a student in any course in which s/he is enrolled has knowingly committed such a violation, appropriate action will be taken which may result in suspension from the course and a failing grade in the course.