Auto Simulation II
Syllabus

Course Information

Title Auto Simulation II

Course Number 602-161

Credits 3

Organization Gateway Technical College

Developer(s) Steve Semon, Bill Fell

Time(s) Thursday 12:00pm – 5:00pm; 5:00pm – 10:00pm
Friday 7:00am – 12:00pm
8/23/07 – 12/13/07

Prerequisites
1. Student must have a valid drivers license.
2. Engine Performance I, HVAC, and Engine Minor

Goals
1. The student will perform all P-1, 80% of P-2, and 50% of P-3 tasks required for this course and prepare for the ASE Chassis Electrical, HVAC Certification exams.

Description This course will allow the student to perform NATEF tasks in areas Electrical, HVAC and Minor Engine systems. The tasks are to be performed in conjunction with the repair of a school owned vehicle in a simulated shop environment. A strong emphasis is placed on customer relations and communications. Students will perform both Service Writer and Parts Person Positions on a rotating basis as well as performing NATEF Tasks. Student preparedness for the ASE (Automotive Service Excellence) certification exam is emphasized.

Standards Demonstrate personal and environmental safety practices.
Diagnose general engine concerns.
Diagnose vehicle electrical systems concerns.
Diagnose HVAC concerns.

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Core Abilities Act responsibly
Communicate clearly and effectively.
Demonstrate essential computer skills.
Develop the skills required to successfully seek and obtain Employment.
Respect self and others as members of a diverse society.
Think critically and creatively.
Work cooperatively.
Value learning.

Competencies

1. Demonstrate personal and environmental safety practices.
2. Diagnose and repair general engine concerns.
3. Engine related services.
4. Diagnose and service batteries.
5. Diagnose and repair starting systems.
6. Diagnose and repair charging systems.
7. Diagnose and repair lighting systems.
8. Diagnose and repair horn, wiper/washer systems.
9. A/C system diagnosis and repair.
10. Evaporator, Condenser and related components.
11. HVAC systems diagnosis and repair.
12. Operating systems and related components.
13. Refrigerant recovery, recycling, and handling.
14. Read and interpret technical information.
15. Use electronic service information.
16. Write repair orders.

Grading Policy

Grading Rationale The learner must complete all required NATEF tasks and demonstrate a level 3 skill rating while performing repairs on customer vehicles under the supervision of instructor(s) and or ASE certified mentor. Performance Evaluation Forms (Self and Instructor) must be completed for each service or repair performed.

Student must describe one repair they have performed each week in class. These repairs will be delivered orally each week and count as 30% of you grade.

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Student must on a rotating basis perform the duties of a Service Writer. Duties include making appointments, writing repair orders, writing estimates, keeping track of vehicles being repaired, and notifying customers of vehicle repair status and finish times.

Student must on a rotating basis perform the duties of a Parts Person. Duties include ordering parts needed for repairs in service, ordering shop supplies, providing prices to the Service Writer to aide in writing estimates Working as tool room handler to dispatch and check in special tools.

SKILL LEVEL 4 – Scored 45pts out of 50pts possible on the Service Simulation Evaluation form.

SKILL LEVEL 3 – Scored 40pts out of 50pts possible on the Service Simulation Evaluation form.

SKILL LEVEL 2 – Scored 35pts out of 50pts possible on the Service Simulation Evaluation form.

SKILL LEVEL 1 – Scored 30pts out of 50pts possible on the Service Simulation Evaluation form.

SKILL LEVEL 0 – Scored 25pts out of 50pts possible on the Service Simulation Evaluation form.

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Grading Scale

Grade	Requirement
A	MUST COMPLETE ALL P-1 TASKS, 80% OF P-2 TASKS AND 50% OF P-3 TASKS, ACHIEVED A 4 SKILL RATING ON 90% OF SERVICE SIMULATION EVALUATIONS. Score a 4 skill rating on 90% of the verbal presentations. Score 70% or better on the related ASE EXAM.
B	MUST COMPLETE ALL P-1 TASKS, 80% OF P-2 TASKS AND 50% OF P-3 TASKS, ACHIEVED A 4 SKILL RATING ON 75% OF SERVICE SIMULATION EVALUATIONS. Score a 4 skill rating on 80% of the verbal presentations. Score 70% or better on the related ASE EXAM.
C	MUST COMPLETE ALL P-1 TASKS, 80% OF P-2 TASKS AND 50% OF P-3 TASKS. ACHIEVE A 3 SKILL LEVEL FOR SERVICE SIMULATION EVALUATIONS. Score a 3 skill rating on 80% of the verbal presentations. Score a 70% or better on the related ASE EXAM.
D	NOT COMPLETED ALL P-1 TASKS, 80% OF P-2 TASKS AND 50% OF P-3 TASKS, OR ACHIEVED A 3 SKILL LEVEL RATING FOR SERVICE SIMULATION EVALUATIONS. Did not perform the required 6 verbal Presentations and or scoring less then 70% on the related ASE EXAM.
F	NOT COMPLETED ALL P-1 TASKS, 80% P-2 TASKS AND 50% OF P-3 TASKS, IN THE ALLOTTED TIME

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Policies and Information

Class procedures and Requirements

ATTENDENCE: You are responsible to be in class according to the schedule you were provided. You must complete the VEHICLE REPAIRS or SERVICE in 2X OR twice the published FLAT RATE TIME. You must call the lab and let an instructor know you be ABSENT or LATE. CALL ? and leave a voice mail message. A doctors excuse may be required.

SAFETY and OPERATIONAL POLICY: Students must follow all posted and written course procedures regarding safety and course operations. Failure to follow safety procedures or course procedures after a verbal and written citation will result in a DISMISSAL from the course.

COURSE REQUIREMENTS: Student must have a valid drivers license. Service Simulation Activities are taken from the NATEF tasks list, they should be completed independently without assistance but may be completed with a partner, MAXIMUM skill level given with a partner will be a 3 rating by an instructor.

VERBAL PRESENTATIONS: Students must participate in all verbal presentations both in presentation and discussion.

SERVICE WRITER: Write service orders, work with Parts Person to compile estimates, and students to keep track of vehicles being repaired. Perform any other duties the Instructor feels need to be done.

PARTS PERSON: Work with students to get parts prices and parts need for repairs. Work with Service Writer to compile estimates. Check out and check in specialty tools.

Order shop supplies and perform any other duties Instructor feels need to be done.

SIMULATION II
NATEF TASKS

ELECTRICAL/ELECTRONIC SYSTEMS

For every task in Electrical/Electronic Systems, 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.

VI. ELECTRICAL/ELECTRONIC SYSTEMS

A. General Electrical System Diagnosis

1.	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
2.	Identify and interpret electrical/electronic system concern; determine necessary action.	P-1
3.	Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.	P-1
4.	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).	P-1
5.	Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).	P-1
6.	Use wiring diagrams during diagnosis of electrical circuit problems.	P-1
7.	Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.	P-1
8.	Check electrical circuits with a test light; determine necessary action.	P-2
9.	Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.	P-1

10.	Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.	P-1
11.	Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.	P-1
12.	Check electrical circuits using fused jumper wires; determine necessary action.	P-2
13.	Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.	P-1
14.	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.	P-1
15.	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.	P-1
16.	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.	P-1
17.	Remove and replace terminal end from connector	
18.	Repair connectors and terminal ends.	P-1
19.	Repair wiring harness (including CAN/BUS systems).	
20.	Perform solder repair of electrical wiring.	P-1
21.	Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures	P-3

VI. ELECTRICAL/ELECTRONIC SYSTEMS

B. Battery Diagnosis and Service

1.	Perform battery state-of-charge test; determine necessary action.	P-1
2.	Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.	P-1
3.	Maintain or restore electronic memory functions.	P-1
4.	Inspect, clean, fill, and replace battery.	P- P-1

5.	Perform slow/fast battery charge.	P-2
6.	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.	P-1
7.	Start a vehicle using jumper cables and a battery or auxiliary power supply.	P-1

VI. ELECTRICAL/ELECTRONIC SYSTEMS

C. Starting System Diagnosis and Repair

1.	Perform starter current draw tests; determine necessary action.	P-1
2.	Perform starter circuit voltage drop tests; determine necessary action.	P-1
3.	Inspect and test starter relays and solenoids; determine necessary action.	P-2
4.	Remove and install starter in a vehicle.	P-1
5.	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.	P-2
6.	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

D. Charging System Diagnosis and Repair

1.	Perform charging system output test; determine necessary action.	P-1
2.	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.	P-1
3.	Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.	P- P-1
4.	Remove, inspect, and install generator (alternator).	P-1

5. Perform charging circuit voltage drop tests; determine necessary action. P-1

VI. ELECTRICAL/ELECTRONIC SYSTEMS

E. Lighting Systems Diagnosis and Repair

1. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. P-1

2. Inspect, replace, and aim headlights and bulbs. P-2

3. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

F. Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair

1. Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. P-1

2. Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. P-3

3. Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. P-1

4. Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. P-
P-3

VI. ELECTRICAL/ELECTRONIC SYSTEMS

G. Horn and Wiper/Washer Diagnosis and Repair

1. Diagnose incorrect horn operation; perform necessary action. P-2

2. Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action. P-2

3.	Diagnose incorrect washer operation; perform necessary action.	P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

H. Accessories Diagnosis and Repair

1.	Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.	P-2
2.	Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action.	P- P-2
3.	Diagnose incorrect electric lock operation; determine necessary action.	P-2
4.	Diagnose incorrect operation of cruise control systems; determine necessary action.	P-3
5.	Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.)	P- P-1
6.	Disarm and enable the airbag system for vehicle service.	P-1
7.	Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.	P-3
8.	Remove and reinstall door panel.	P-1
9.	Diagnose body electronic system circuits using a scan tool; determine necessary action.	P-2
10.	Check for module communication (CAN/BUS) errors using a scan tool.	P-3
11.	Diagnose the cause of false, intermittent, or no operation of anti-theft systems.	P-2

HEATING AND AIR CONDITIONING

For every task in Heating and Air Conditioning, 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 AND AIR CONDITIONING

A. A/C System Diagnosis and Repair

1.	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.	P-1
2.	Identify and interpret heating and air conditioning concern; determine necessary action.	P-1
3.	Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins.	P-1
4.	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals).	P-1
5.	Performance test A/C system; diagnose A/C system malfunctions using principles of refrigeration.	P-1
6.	Diagnose abnormal operating noises in the A/C system; determine necessary action.	P-2
7.	Identify refrigerant type; select and connect proper gauge set; record pressure readings.	P-1
8.	Leak test A/C system; determine necessary action.	P-1
9.	Inspect the condition of discharged oil; determine necessary action.	P-2
10.	Determine recommended oil for system application.	P-1

11. Using scan tool, observe and record related HVAC data and trouble codes. P-1

VII. HEATING AND AIR CONDITIONING

B. Refrigeration System Component Diagnosis and Repair

1. Compressor and Clutch

1. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. P-2

2. Inspect and replace A/C compressor drive belts; determine necessary action. P-1

3. Inspect, test, and/or replace A/C compressor clutch components and/or assembly. P-2

4. Remove, inspect, and reinstall A/C compressor and mountings; measuredetermine required oil quantity. P-1

P-3

2. Evaporator, Condenser, and Related Components

1. Determine need for an additional A/C system filter; perform necessary action. P-3

2. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action. P-2

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

4. Remove, inspect, and reinstall receiver/drier or accumulator/drier; measure determine required oil quantity. P-1

5. Remove and install expansion valve or orifice (expansion) tube. P-1

6. Inspect evaporator housing water drain; perform necessary action. P-3

7. Remove, inspect, and reinstall evaporator; measure determine required oil quantity. determine necessary action P-3

8.	Remove, inspect, and reinstall condenser; measure determine required oil quantity.	P-3

VII. HEATING AND AIR CONDITIONING

C. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair

1.	Diagnose temperature control problems in the heater/ventilation system; determine necessary action.	P-2
2.	Perform cooling system, cap,pressure; determine necessary action Perform cooling system pressure tests; check coolant condition, inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	P-1
3.	Inspect engine cooling and heater system hoses and belts; perform necessary action.	P-1
4.	Inspect, test, and replace thermostat and gasket.	P-1
5.	Determine coolant condition and coolant type for vehicle application; drain and recover coolant.	P-1
6.	Flush system; refill system with recommended coolant; bleed system.	P-1
7.	Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action.	P-1
8.	Inspect and test electric cooling fan, fan control system and circuits; determine necessary action.	P-1
9.	Inspect and test heater control valve(s); perform necessary action.	P-2
10.	Remove, inspect, and reinstall heater core.	P-3

VII. HEATING AND AIR CONDITIONING

D. Operating Systems and Related Controls Diagnosis and Repair

1.	Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action.	P-2
2.	Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action.	P-1
3.	Test and diagnose A/C compressor clutch control systems; determine necessary action.	P-1
4.	Diagnose malfunctions in the vacuum, andmechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.	P-2
5.	Inspect and test A/C-heater control panel assembly; determine necessary action.	P-3
6.	Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action.	P-3
7.	Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action.	P-3
8.	Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.	P-3

VII. HEATING AND AIR CONDITIONING

E. Refrigerant Recovery, Recycling, and Handling

1.	Perform correct use and maintenance of refrigerant handling equipment.	P-1
2.	Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant.	P-1
3.	Recycle refrigerant.	P-1
4.	Label and store refrigerant.	P-1
5.	Test recycled refrigerant for non-condensable gases.	P-1

6. Evacuate and charge A/C system. P-1

ENGINE PERFORMANCE

For every task in Engine Performance 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.

VIII. ENGINE PERFORMANCE

A. General Engine Diagnosis

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1

2. Identify and interpret engine performance concern; determine necessary action. P-1

3. Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins. P-1

4. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals). P-1

5. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-2

6. Diagnose abnormal engine noise or vibration concerns; determine necessary action. P-2

7. Diagnose abnormal exhaust color, odor, and sound; determine necessary action. P-2

8. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. P-1

9. Perform cylinder power balance test; determine necessary action. P-1

10. Perform cylinder cranking compression tests; determine necessary action. P-1

11.	Perform engine running compression test; determine necessary action.	P-2
12.	Perform cylinder leakage test; determine necessary action.	P-1
13.	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.	P-1
14.	Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.	P-1
15.	Verify engine operating temperature; determine necessary action.	P-1
16.	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.	P-1
17.	Verify correct camshaft timing.	P-2

VIII. ENGINE PERFORMANCE

F. Engine Related Service

1.	Adjust valves on engines with mechanical or hydraulic lifters.	P-1
2.	Remove and replace timing belt; verify correct camshaft timing.	P-1
3.	Remove and replace thermostat and gasket.	P-1
4.	Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.	P-1
5.	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
6.	Perform oil and filter changes.	P-1
7.	Demonstrate proficiency in using oxy-acetylene torch to heat and cut metal.	P-3
8.	Identify hybrid vehicle internal combustion engine service precautions.	P-3

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