

Grays Harbor College

AUTOMOTIVE TECHNOLOGY AUTO 212: Fuel Systems/Electronic/Computer Controls 16 Credits Denis Samson, Instructor

Course syllabus, Winter

Associate in Technology Degree

Prerequisite Requirements:

Placement in MATH 60, ENGLISH 60, and Instructor permission.

<u>Core Courses</u>	<u>Credits</u>
AUTO 111 Brakes / Suspension / Steering	16
AUTO 112 Electrical / Electronics / ABS	16
AUTO 113 Engines / Electrical / Tune-up / Ignition	16
AUTO 211 Power Train / Transmissions (Manual and Automatic)	16
<u>AUTO 212</u> <u>Fuel Systems / Electronic / Computer Controls</u>	<u>16</u>
AUTO 213 Advanced Engine Performance / Air Conditioning / Heating.	16

Credits Required **96**

Support Courses

WELD	101	Related Welding 1	6
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Credits Required **6**

General Education Courses

ENGL	101	Expository / Argumentative Writing	5
		Or	
ENGL	150	Vocational / Technical / Business Writing	5
MATH	100	Vocational / Technical Math (or higher)	5
PSYCH	100	General Psychology	5
		Or	
PSYCH	106	Applied Psychology	3
		Or	
SOC	101	Introduction to Sociology	5

Credits Required ~~13~~ **15**

Elective Courses

AUTO	224	Work Experience	1-5
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Elective Courses must be approved by the student's academic advisor at Grays Harbor College

~~Minimum Credits Required~~ ~~116+~~
3 PE Credits

See Grays Harbor College Catalog or GHC web page at www.ghc.edu for Course Outlines for Automotive Certificate of Completion and Automotive Certificate of Achievement Program.

I. COURSE DESCRIPTION:

Prerequisite: CPT in Math 60, English 60 and instructor permission

The foundation for Automotive Technology provided in this course includes a study of safety rules and procedures, use of shop tools, equipment, and study of fuel management systems currently in use by the automotive industry. This course is advanced study of the fuel management systems used to meet current emission, fuel economy and performance requirements of the modern automobile. The course includes an in-depth study of fuel injection systems used on domestic and foreign vehicles. Other skill lessons included in this class are: identification of components, on car diagnosis, and replacement of components. Utilization of modern test equipment such as scanners and analyzers will be stressed. Much emphasis will be given to diagnosis and troubleshooting techniques, 8 lecture hours, 16 lab hours. May be used as a general elective in the AA degree.

II. COURSE OBJECTIVES

To meet the course standards and demonstrate the ability to meet the outcomes expectations of this course (Competency in the discipline (4 CD), Literacy (2 L), Critical Thinking (3 CT), Social and Personal responsibility (4 SP), and Information Used (4 IU)] student will:

Demonstrate employability by following safe work practices, being on time, maintaining proper attendance, and properly following written and oral instruction (SP)

Demonstrate safety and proper work habit (CD, SP)

Meet NATEF competency criteria in the following areas:

- 1) Identify fuel system components and state purpose of each. (L, CT)
- 2) Identify sensors and circuits and troubleshoot utilizing computer safe procedures. (CD, SP, IU)
- 3) Identify and test actuator circuits and troubleshoot with computer safe procedures. (CD, SP, IU)
- 4) Diagnose malfunctions in the fuel system. (CD, CT, SP, IU)
- 5) Interpret data from system and gas analyzers. (L, CT, IU)
- 6) Diagnose and interpret drivability problems. (CD, L, CT, IU)
- 7) Troubleshoot customer complaints. (CD, CT, SP)
- 8) Determine needed repairs. (CD, CT, IU)

III. INSTRUCTIONAL TECHNIQUE

AUTO 111 is taught 4 hours and 5 minutes per day, plus one 15 minute break, Monday – Friday, for a period of about 11 weeks. The methods of instruction will be lecture, discussion, classroom exercises, demonstrations, and lab work. There will be eight hours per week for lecture presentations and sixteen hours per week hands on in the lab/shop experience. Lab/shop work is emphasized with small groups and one to one instruction when possible.

IV. DISABILITES

If you have a documented disability that may interfere with your ability to fully participate in this class, you may be eligible for accommodations. Contact your instructor or the Disability Support Services located on campus in the Student services, room 119. Information regarding any disability will be kept confidential

V. WORK HABITS

Industry has expressed attendance, punctuality, and general work habits as critically important for success on the job. The standards of this course include industry expectations. If you want to do well, the following will have to occur: show up **every day**, be on time, clean, fed, wide awake and thinking about automotive, with neatly and correctly completed homework ready to turn in. When class starts...participate! Keep safety first. Treat equipment with respect. Be conscientious and considerate of others. Make productive use of the time available. Clean up after yourself. Feel good about yourself, your work, and your progress.

Efficient use of time is vital. The Automotive Competency Lists are designed to require effective time management for successful completion. Just like on the job, you can expect to have to plan out your tasks and periodically work on two or more competencies simultaneously to avoid unnecessary delays waiting for a special tool or for shared equipment.

This is a full-time training program. The main goal is to build technical and workplace skills. The quantity and skill level requirements of the Automotive Competency Lists and homework, combined with the strict enforcement of work habits standards, grading criteria, and shop rules, is intended to maximize your likelihood of success in the industry. Focus, a “can-do” attitude, and prioritization of your education is both expected and necessary in order to be successful.

VI. HOME WORK

Regular Assignments: To be handed in daily.

Processed in Microsoft Word.

Times New Roman, 12 point font, double-spaced, 1 ¼” margins and at least 14 lines in length.

More than **1** mistake or ANY mistake on heading: lose 3 points off your work habits point sheet.

Basic Chapters (1-2-3-4-5-6-7) will be discussed in class.

You will be given a complete homework schedule for the entire quarter.

In case of an absence, all homework that is required will be due from you the day you return.

VII. ATTENDANCE POLICY.

Attendance is graded. There are no excused absences. You are expected to be present every day for the entire quarter. Lost points cannot be made up. If a problem arises that will cause you to miss enough class to fail the course, see admissions to request an official withdrawal.

If you will miss class for some reason, please call or tell a friend or family member to call and leave a message on the shop answering machine by 7:00 a.m. An absence with **prior** notice by 7:00 a.m. of the day absent will score 0 points for the day. An absence **without** prior notice by 7:00 a.m. of the day absent will score -5 for the day.

TARDINESS / LEAVING EARLY

Arriving after 9:30 or leaving before 9:45 is an absence. Whatever the case, notify the Instructor or the Instructor Aid as soon as you arrive or immediately before you leave.

VIII. “A” TEAM

Automotive Technicians earning 3 consecutive “A’s” in the 16 credit core automotive courses will be inducted into the A Team. A Team members will be awarded the coveted gray hat and be included in the annual spring A team photo.

IX. METHOD OF EVALUATION

Students will earn two grades in this course, a work habits point sheet grade, and a shop/competency/participation grade. The **Lower** of the two letter grades earned is the overall grade earned.

Work Habits Points Sheets Grade:

Attendance, Punctuality, and Time Card, Tags,
 Homework Assignments handed in on time, (see work habits point sheet),
 Final Exam (written 10% and practical test 90%) and also chapter exams.

Point Schedule:.....Daily Total5 points

<u>Homework not handed on time</u>	Lose 3 points per day.
<u>Homework with more than 1 mistake</u>	Lose 3 points per day.
<u>Homework with incorrect heading</u>	Lose 3 points per day.
<u>Late Homework not handed in the next day</u>	Lose 3 points per day.
<u>Inaccurately filling time card</u>	Lose 1 point per mistake.
<u>Chapter test below 80%</u>	Lose 3 points
<u>Final Exam below 80%</u>	Lose 1 grade (ex: A to B)
<u>Unauthorized use of a cell phone or texting</u>	Lose 3 points each time.

Shop / Competency / Participation Grade:

Competency completed and signed by you and me. In order to get a competency signed, the work order needs to be completed and closed.
 Correctly complete work orders and include the task with the work order when required by the competency.

This percentage is based on work habits points, and competencies collected during the quarter. The Chapter and Final exams can not be repeated. Students not present for any exam will be given a zero.

Auto 111	MINIMUM REQUIREMENTS FOR GRADE OF			
	A	B	C	D
Work Habits Points	94%	90%	85%	80%
Competency	90%	80%	70%	70%

If you have a course grade below C more than once, you will be on probation by the administration.

Pluses and minus will not be used. In addition, grade will also be lowered by one full letter if you are awarded and accept a local scholarship, but **FAIL** to attend the donor recognition ceremony in the spring: Ex: If you finish the class with “B”, you will get a “C”.

X. CLEAN UP PROCEDURE

Clean up starts when signaled. You may clean up early if you desire, but you will be docked points same as for leaving early.

Final grade computed will be lowered by one full letter if absent on the last day of class (shop clean up day). Arriving late or leaving early is the same as not being here that day.

XI. ATTENDANCE POLICY

NAME: _____

GHC Automotive Technology – WORK HABITS POINT SHEET

Circle present week: 1 2 3 4 5 6 7 8 9 10 11 12

5 points are possible per day. Deduct 3 points for arriving late, leaving early. Deduct 3 points for not turning in completed homework at the time it is collected or if there is more than 1 mistakes or late homework not supplied the next day. Deduct 1 point for inaccurately filling out the time card. 5 points will be deducted (for you) if you are sent home, **inaccurately** record your points for the day, or take an unauthorized break. **An absence is equal to 0 points.** When failing a test 3 point must be deducted even if it mean going below 0. Leaving tag(s) in tool room after returning a tool(s) -1. Points cannot be made up.

Day	Points earned	Explanation if less than 5 points	Tags Tools -1	Test -3	Home work -3	Time card -1	Cell Phone or texting -3
M							
T							
W							
Th							
F							

Total points earned as of last week: _____
 (Monday)

Points earned this week: + _____
 (Friday)

Total points earned to date: = _____ Total points possible _____
 (Friday) Adding wrong cost= **5 points** (Monday)

Total points earned today divided by total points possible = _____ %
 (Friday)

Current work habits letter grade (Friday): _____

	A	B	C	D
Work Habits Point Grade	94%	90%	85%	80%
Competency Point Grade	90%	80%	70%	70%

 Student Signature

 Instructor Signature

(The **lower** of the two grades earned is the highest possible grade for the quarter. Additional requirement apply – see syllabus.)

XII. **HOMEWORK EXAMPLE**

Name _____ Course: AT212 Date: _____

Chapter 24

Pages Covered 1067 to 1070

Welcome to Grays Harbor College Automotive Technology program. During this quarter we will have morning lecture and lab time. We will have test and a final exam. First thing in the morning I will pick up your home work. During the lecture I will perform experiments with instructional tools and cut away equipment. In the lab you will be working on variety of cars: Chevrolet, Ford, Volvo, Hyundai and many more. These cars are available to allow you to develop and improve your working skill by diagnosing and removing and installing components. There is a wide variety of tools available to you thru the use of tags. The lab will have to be kept clean and you will have to wear coverall and make good use of fender cover in order to keep the cars clean. You will find this course very challenging and instructive. My Instructor Aid and I will be in the lab giving information to help you understand what you are doing but we will not do the work for you. As a student you will have to retrieve information about the task you are performing on a specific car from our computer. After each task you will sign a competency and I will sign it too, then you will be able to continue other tasks. During this quarter you will have to be here before the class starts and you will have to participate by being here every day. You will learn to use a time clock, write work orders and learn good work habits.

Note: Filling the heading incorrectly will result in -3 on your points sheet.

Requirements: margin 1 ¼, **font 12(Time New Roman)**, double space, 14 lines minimum,
-3 points if there are more than 1 mistake.

XIII. COURSE OUTLINE:

1. INTRODUCTION AND SAFETY
 - a. Purpose of course
 - b. Safety items

2. FUEL MANAGEMENT
 - a. Description of components
 - b. Electronic control modules (ECM)
 - c. ECM-PROM service
 - d. Oxygen sensor
 - e. Engine coolant temperature sensor
 - f. Pressure sensors

3. EMISSION CONTROLS
 - a. Exhaust gas recirculation valve
 - b. Catalytic Converter, O₂ sensor function.
 - c. Positive ventilation valve,
 - d. EVAP system function and diagnosis.

4. ON-CAR DIAGNOSIS
 - a. Check engine light/service engine light
 - b. Self diagnostics
 - c. System performance checks

5. FUEL SYSTEM COMPONENTS
 - a. Throttle Body Injection system
 - b. Ported Fuel Injection system
 - c. Multi-ports fuel injection system
 - d. Gas Direct Injection system
 - e. Fuel pumps
 - f. Fuel pressure regulators
 - g. Fuel injectors
 - h. Fuel filters

6. ECM MODES OF OPERATIONS
 - a. Starting mode
 - b. Clear flood
 - c. Run mode
 - d. Open loop
 - e. Closed loop
 - f. Acceleration enrichment
 - g. Deceleration lean out
 - h. Deceleration fuel cut-off
 - i. Battery voltage compensation
 - j. Limp home or back-up mode

XIV. INSTRUCTIONAL MATERIALS, SUPPLIES, AND EQUIPMENT:

The student will provide:

1. Textbooks
2. Notebook and composition book for journal
3. Pencils, **pens**, and colored markers as needed
4. Personal hand tools: see required tool list
5. Safety glasses
6. Disposable gloves...nitrile, not latex (latex dissolves easily in the chemicals we use)

XV. TEXTBOOKS: REQUIRED

Various textbooks are used based on current editions of manuals and published textbooks. Please see your instructor for current textbook required.

The instructor will provide:

1. Selections from Service Manuals and Electronic Service Manuals
2. Other handouts as required

Note: Coveralls are supplied to all students (special lab fee).

I have received and read the syllabus for AUTO 212 for Winter Quarter. I acknowledge this by my signature below.

Print Name	Signature	Date
1 _____	_____	_____
2 _____	_____	_____
3 _____	_____	_____
4 _____	_____	_____
5 _____	_____	_____
6 _____	_____	_____
7 _____	_____	_____
8 _____	_____	_____
9 _____	_____	_____
10 _____	_____	_____
11 _____	_____	_____
12 _____	_____	_____
13 _____	_____	_____
14 _____	_____	_____
15 _____	_____	_____
16 _____	_____	_____