

# Grays Harbor College

## AUTOMOTIVE TECHNOLOGY AUTO 111: Brakes/Suspension/Steering 16 Credits Denis Samson, Instructor

### Course syllabus, Fall

Associate in Technology Degree

**Prerequisite Requirements:**

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

<u>Core Courses</u>	<u>Credits</u>
<b>AUTO 111</b> <b>Brakes / Suspension / Steering</b>	<b>16</b>
AUTO 112      Electrical / Electronics / ABS	16
AUTO 113      Engines / Electrical / Tune-up / Ignition	16
AUTO 211      Power Train / Transmissions (Manual and Automatic)	16
AUTO 212      Fuel Systems / Electronic / Computer Controls	16
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
		<b>Or</b>	
ENGL	150	Vocational / Technical / Business Writing	5
MATH	100	Vocational / Technical Math (or higher)	5
PSYCH	100	General Psychology	5
		<b>Or</b>	
PSYCH	106	Applied Psychology	3
		<b>Or</b>	
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](http://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, steering, suspension, and alignment procedures currently in use by the automotive industry. This course provides theory and application of conventional and strut type suspension systems and modern braking systems. The student is introduced to conventional and rack and pinion types of steering systems, applies two-wheel and four-wheel alignment procedures, applies tire and wheel balance procedures. The second part of this course is a study of brakes and brake control systems, including brake system hydraulics and hardware. The student will practice brake service procedures, brake performance diagnostic and troubleshooting methods. 8 lecture hours; 16 lab hours. Vocational program course. 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 safety rules and procedures. (L, CT, IU)
- 2) Identify measuring instruments and procedures. (L, CT, IU)
- 3) Identify automotive service tools and equipment. (L, CT, IU)
- 4) Identify the various components used on automotive steering and suspension systems and describe the function of each. (L, IU)
- 5) Diagnose any malfunction of the steering and suspension components used on automobiles. (CD, CT, IU)
- 6) Identify all the measurements to be made when properly checking the alignment of an automobile. (CD, CT, SP, IU)
- 7) Diagnose tire wear problems and/or vibrations and describe the necessary repairs. (CD, CT, IU)
- 8) Disassemble, inspect, clean, and re-assemble all components of the steering and suspension systems as in accordance to the service manuals procedures. (CD, L, SP, IU)
- 9) Perform two-wheel alignments. (CD, CT, SP, IU)
- 10) Perform four-wheel alignments. (CD, CT, SP, IU)
- 11) Perform tire balancing. (CD, CT, SP, IU)
- 12) Identify the various brake components used on automobiles and describe the functions of each. (L, CT)
- 13) Diagnose brake component/system malfunctions. (CD, CT, SP, IU)

- 14) Identify the special tools necessary to properly diagnose and repair brake components/system malfunction(s). (L, US)
- 15) Demonstrate proper use of special tools in diagnosing and repairing brake component malfunctions. (CD, SP, IU)
- 16) Disassemble, clean, inspect, and measure for wear all components of brake systems following established service manual procedures. (CD, CT, SP, IU)
- 17) Refinish a brake rotor and/or brake drum following established service manual procedures. (CD, L, SP, 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. DISABILITIES**

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 Total .....5 points**

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

**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.**

<b>Auto 111</b>	<u>MINIMUM REQUIREMENTS FOR GRADE OF</u>			
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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
<b>Work Habits Point Grade</b>	<b>94%</b>	<b>90%</b>	<b>85%</b>	<b>80%</b>
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.)



**XIII. COURSE OUTLINE:**

1. INTRODUCTION/SAFETY
  - a. Purpose and Scope of Course
  - b. Safety Considerations and Strategies
  
2. MEASUREMENTS
  - a. Measuring Systems
  - b. Measuring Tools
  
3. AUTOMOTIVE STEERING COMPONENTS
  - a. Steering Columns
  - b. Steering Gears (Manual, Power)
  - c. Power Steering Pumps
  - d. Steering Component Malfunctions
  - e. Steering Component Unit Repair
  
4. SUSPENSION COMPONENTS
  - a. Short Arm-Long Arm Suspensions
  - b. McPherson Strut Suspension
  - c. Front Cradle Suspension
  - d. Rear Suspensions
  - e. Suspension Component Malfunctions
  - f. Suspension Component Unit Repair
  
5. ALIGNMENT
  - a. Basic Alignment Angles
  - b. Front Suspension and Steering Geometry
  - c. Effects of Misalignment
  - d. Measuring Alignment Angles
  - e. Adjusting Alignment Angles
  
6. TIRE WEAR AND VIBRATION DIAGNOSES
  - a. Visual wear patterns
  - b. Noise, Vibration, Harshness
  - c. Drivability
  
7. HYDRAULIC BRAKE COMPONENTS
  - a. Master Cylinders
  - b. Combination Valve
  - c. Pressure differential warning switch
  - d. Metering valve
  - e. Proportioning valves
  - f. Caliper and Wheel Cylinder
  - g. Troubleshooting Brake Hydraulic Malfunctions
  - h. Flush/Bleed Procedures
  - i. Special Tools for Repairing Brake Hydraulic Malfunctions

8. MECHANICAL BRAKE COMPONENTS
  - a. Braking Units at Wheels
  - b. Duo-Servo Drum Brake
  - c. Direct Torque Drum Brakes
  - d. Leading/Trailing Shoe Type Drum Brake
  - e. Drum and Rotor Measurement Procedures
  - f. Drum and Rotor Refinish Procedures
  - g. Troubleshooting Brake Mechanical Malfunctions
  - h. Proper Assembly and Adjustment Procedures
  
9. POWER ASSIST BRAKE COMPONENTS
  - a. Vacuum Assist
  - b. Single diaphragm
  - c. Tandem vacuum
  - d. Hydro-boost II
  - e. Powermaster Brake System
  - f. Troubleshooting Power Assist Malfunctions
  
10. ANTI LOCK BRAKE SYSTEM
  - a. Speed sensor and ABS computer
  - b. ABS unit description and operation
  - c. Troubleshooting ABS Malfunctions
  - d. Testing sensor with lab scope and DMM.

**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 111 for Fall 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 _____	_____	_____