AUT 107 Mechanical Systems I
3 Credits
College Now/CTE
Student Outcomes Checklist

cocc.edu/departments/college-now

Student's Name_____

Student's Signature _____**Completion Date**_____

High School Teacher's Signature _____

Recommended Grade_____ **High School** _____

COCC Review Faculty's Signature _____

COURSE DESCRIPTION: Provides an understanding of the fundamental principles of automotive shop safety and tool care. Develops mechanical knowledge and skills utilized throughout a career in the automotive field. Includes techniques of routine vehicle maintenance. Includes customer vehicle identification and handling, new vehicle pre-delivery inspection and preparation, safety inspection, lubrication tasks, and light line tasks.

REQUIRED DOCUMENTATION: The high school teacher will send the completed student outcomes checklist, graded final exams and the signed final grade roster to: College Now Office, Central Oregon Community College, 2600 NW College Way, Bend, OR 97703.

GRADING: A, A-, B+, B, B-, C+, C, D, F.
See College Now Grading Policy.

FINAL EXAM GRADING SCALE

Final Raw Score					
100 – 92	A	(4.0 Points)	81 – 80	B-	(3.3 Points)
91 – 90	A-	(3.7 Points)	79 – 78	C+	(2.3 Points)
89 – 88	B+	(3.3 Points)	77 – 70	C	(2.0 Points)
87 – 82	B	(3.0 Points)	69 – 65	D	(1 Point)
			< 64	F	(0 Points)

FINAL GRADE COMPUTATION: Assign points based on letter grade given for the Outcomes and the Final Exam.

Outcomes: _____**Points x 85%** = _____**Points**

Final Exam: _____**Points x 15%** = _____**Points**

Total: _____**Points**
Recommended Letter Grade: _____

COURSE INSTRUCTIONS: This course utilizes a mastery level grading system. Mastery means that the student has completed each learning station at 100% proficiency. If the student does not attain 100% proficiency on the first try, it is the student's responsibility to repeat the activity until 100% proficiency is attained. The teacher will initial each outcome when the student achieves 100% proficiency. After all outcomes are completed, the student will complete the final exam without assistance. To request a copy of the final exam and answer key contact College Now Office at 541.504.2930.

OUTCOMES CHECKLIST: For you to succeed in this class, you must take ownership of these outcomes. Repeat each skill until you are 100% proficient. Your teacher will observe your skill and initial each task when you have attained 100% proficiency.

COURSE OUTCOMES:
1. Develop mechanical skills and knowledge through completion of chapter questions and hands on lab tasks.
2. Gain the abilities to perform task like those found in the automotive service industry.
3. Perform successfully nine lab tasks: collect vehicle data and information from the vehicle and other resources, remove and install tire and wheels properly while performing a brake inspection and tire rotation, use specialized measuring instruments to measure assigned engine components, use multimeters to measure assigned automotive electrical components, perform maintenance and safety inspections on assigned class vehicles, demonstrate the ability to use a mechanical vehicle hoist (lift) when performing a lubrication service, gain an understanding of fasteners used in the automotive industry.
4. Demonstrate verbal and written communication skills while performing assigned lab tasks.

Below are the areas that will be covered in AUT 107 Mechanical Systems I.

SAFETY, CLOTHING, AND EQUIPMENT

The student should be able to:

_____1. Demonstrate safety and personal protection when in a shop environment.
- a. Identify the considerations in the selection of individual protective clothing and equipment.
- b. Identify the dangers of improper behavior in the shop.
- c. Identify the reasons why proper grooming and hygiene are important.

_____2. Demonstrate safe vehicle operation in and around the shop.

_____3. Demonstrate the safe use of electrical equipment in the shop.

_____4. Demonstrate: Neatness during and after work
Oily rag disposal methods.
Potential fire hazards.
Handling of volatile fuels.

- a. Identify why shop cleanliness and orderliness are important.

- b. Identify the procedures for maintenance and repair of the shop facilities and equipment.

_____5. Demonstrate correct general shop rules:
Use of jack stands while under a vehicle.
No horseplay or running in the shop.
Reporting of accidents.
Safety while around powered equipment.
Use of fuels when starting a vehicle.
Correct tool usage.
Correct lifting practices.

- a. Identify the different areas of OSHA regulations.

_____6. Demonstrate current FIRE SAFETY STANDARDS and be aware of the location and operation of fire-fighting equipment in the work area.

a. Identify the different classes of fires and the proper fire extinguisher to use for each class of fire.

b. Identify the procedures for the use of a fire blanket.

c. Identify fire emergency procedures.

_____7. Identify the hazardous materials in your shop area and become acquainted with the "Right To Know Law". This includes Material Safety Data Sheets (MSDS).

_____8. Identify chemicals commonly used in the automotive shop as well as safety precautions for use of these chemicals.

a. Identify the different types of solvents used in the automotive industry.
b. Identify the hazards and precautions in the use of solvents common in the automotive industry.
c. Identify the different types of automotive soaps and cleaning solutions, their purpose and correct use.
d. Identify the different types and purposes of oils, greases, and specialty additives.
e. Identify the hazards and precautions in the use, handling, and storage of oils, greases, and specialty additives.
f. Identify the general rules for the use of chemicals used in the automotive industry.
g. Identify the gasses encountered in the automotive industry and hazards these gasses present.
h. Identify the hazards and control of asbestos dust.
i. Identify the different areas of EPA regulations.

_____9. Demonstrate the correct handling and disposal of hazardous waste.

a. Identify specific laws that govern the disposal of hazardous waste.

BASIC HAND TOOLS for the AUTOMOTIVE SERVICE TRADE

_____1. Demonstrate the correct use of end wrenches, sockets, and specialty wrenches in the disassembly and assembly of a vehicle power train.

a. Identify the types and uses of common end wrenches.
b. Identify the types and uses of various socket set components.
c. Identify the types and uses of various specialty wrenches.

_____2. Demonstrate the correct use of various screwdrivers and various styles of pliers in the disassembly and assembly of a vehicle power train.

a. Identify the types and uses of various wrenches.
b. Identify the types and uses of various styles of pliers.

_____3. Demonstrate the correct use of various hammers and various punches and chisels in the disassembly and assembly of a vehicle power train.

a. Identify the types and uses of various hammers.

b. Identify the types and uses of various punches and chisels.
c. Demonstrate the ability to use a chisel for cutting off a rivet head properly.
d. Demonstrate the ability to use a hammer and punch to remove a rivet properly.
e. Demonstrate the ability to use a stationary grinder to properly redress a chisel.

SPECIALTY TOOLS, FASTENERS, AND PRECISION MEASURING TOOLS

_____1. Identify the various types and uses of specialty tools.
(Specialty tools are considered any tool beyond the basic hand tools, mechanical or electrical).

a. Demonstrate the ability to use a file properly.
File cast iron square stock to under .002" flatness (using a straightedge).
b. Demonstrate the ability to properly use a hacksaw with the correct blade.
Cut and dress cast iron, aluminum, or brass stock or fasteners.
c. Demonstrate the ability to accurately bend and flare tubing.
Bend 1/4 or 5/16 inch tubing to 30^{o}-45^{o}-90^{o} without kinks.
Flare (double-flare)1/4 or 5/16 inch tubing and attach to a transmission, radiator, or brake line without leaking.
d. Demonstrate the ability to perform an oil pressure test and determine the results.
Using an external oil pressure gauge, connect into engine oil passage to measure pressure of an engine at operating temperature. Verify that the pressure is correct according to manufacturer's specifications.
e. Demonstrate the ability to inspect and pressure-test a cooling system properly.
Using an engine cooling system pressure tool, determine the location of all leaks and repair. Repairs should follow correct gasket installation with adhesives, water plug installation, radiator removal, radiator and heater hose replacement with correct clamp location. Pressure testing the radiator cap included.
f. Demonstrate the ability to use a torque wrench accurately.
(Inch-pounds/foot-pounds) (Kilograms-centimeter/Kilograms-meter).
Install and correctly install fasteners on assigned driveline component.
Torque, in sequence, fasteners to manufacturer's specification and procedure.
g. Demonstrate the ability to find wheel torque specifications and torque all wheels to that specification WITHIN 100% ACCURACY.

_____2. Identify the procedures for cutting threads onto a rod or into a hole, repairing damaged threads, and removing broken bolts.

a. Demonstrate removal procedures of a broken bolt (flush) and repair threads.
b. Demonstrate the ability to install a Helicoil according to manufacturer's instructions.
Use an aluminum block-5/16" NC Helicoil-no protrusions.

_____3. Identify the necessary information needed to describe common nuts and bolts in the English fractional system.

_____4. Identify the necessary information needed to describe common nuts and bolts in the metric system.

_____5. Identify the various types of common automotive fasteners.

a. Demonstrate the use of English fractional and metric thread pitch gauges.

_____6. Identify the different purposes of various measuring tools.

_____7. Identify the procedures for the care and use of various measuring tools.

a. Demonstrate the ability to use precision instruments accurately.
b. Demonstrate the ability to check wheel lateral and radial runout with a dial indicator and determine whether a wheel is within tolerance WITHIN 100% ACCURACY.
c. Demonstrate the ability to find engine cubic inch displacement and determine individual cylinder displacement (or metric), determine the compression ratio, perform a dry and wet compression test with a cylinder compression gauge, and determine the results.
d. Demonstrate the ability to measure engine cylinder bore, taper, and out-or-round, using a cylinder bore gauge.
e. Demonstrate the ability to check crankshaft end play properly, using a dial indicator, and determine tolerance on an assigned engine.
f. Demonstrate the ability to check a cylinder head (or block deck) for flatness using a straight edge and feeler gauge.
g. Demonstrate the ability to check engine camshaft lobe lift using a dial indicator.
h. Demonstrate the use of inside and outside micrometers (standard and metric).
i. Demonstrate the use of digital calipers (standard and metric).
Measure crankshaft journals, rod journals, pistons, brake rotors, transmission components.
j. Demonstrate the ability to use a digital multimeter (Fluke 77 will be used), test light, battery hydrometer. Determine:
    a. Continuity in a circuit.
    b. Resistance of various charging system and ignition system components.
    c. Battery state-of-charge using a battery hydrometer and voltmeter.

POWER TOOLS AND SHOP EQUIPMENT

_____1. Identify the types and uses of pneumatic, hydraulic, and electric power tools.

a. Demonstrate the ability to properly use pneumatic-powered tools and hoses safely.
Demonstrate use of tools in the disassembly of a front suspension or drive train component.
b. Demonstrate the ability to use a hydraulic jack properly.
Position jacks in place, inspect, lift, and place stands.
c. Demonstrate the ability to lift a vehicle using a frame contact hoist.
Place pads or forks, lift, inspect, raise vehicle.
d. Demonstrate the ability to set up and ignite an oxyacetylene torch properly.
Requirement to set tank pressures/drain gas from hoses when finished.

_____2. Identify the hazards of power tools.

_____3. Identify the types, purposes, and safety considerations of common shop equipment.

SHOP OPERATION

_____1. Identify proper customer relation procedures.

_____2. Identify the important information needed to write a repair order.

_____3. Identify the information needed to estimate labor charges.

_____4. Identify the information needed to order parts.

_____5. Identify the different sources of vehicle repair procedures.

a. Demonstrate the ability to obtain specific information from a service manual (created by the teacher).

_____6. Identify why shop cleanliness and orderliness are important.

_____7. Identify the procedures for maintenance and repair of the shop facilities and equipment.

CAREERS IN THE AUTOMOTIVE INDUSTRY

*Only material that is preliminary to ASE tasks appears in this unit; therefore, no ASE tasks are covered directly.

_____1. Identify the eight service areas of the automotive industry and the automotive components included in each.

_____2. Identify the career opportunities directly and indirectly related to the automotive industry.

_____3. Identify some of the duties of the automotive technician.

_____4. Identify various methods by which the automotive technician is paid.

_____5. Identify the difference between the union and the non-union shop.

_____6. Identify the importance of honesty to the success of the automotive technician.

FINAL EXAM: After you have completed each skill and are 100% competent, request a copy of the final exam from your high school teacher.

(All appropriate homework assigned using the automotive textbook available as appropriate.)