COURSE OUTLINE OF RECORD

Number: AUTO G101  TITLE: Introduction To Automotive Technology

ORIGINATOR: Eli Jaramillo  EFF TERM: Summer 2010
FORMERLY KNOWN AS:  DATE OF OUTLINE/REVIEW: 03-06-2012
CROSS LISTED COURSE:  TOP NO: 0948.00

SEMESTER UNITS: 3.0  CID:
HRS LEC: 54.0  HRS LAB: 18.0  HRS OTHER: 0.0
CONTACT HRS TOTAL: 72.0
STUDY NON-CONTACT HRS RECOMMENDED: 108.0

This course is designed to teach the student about the operation and maintenance of modern automobiles. There is an emphasis on the theory of the basic operating systems, including engine, electrical, chassis, and driveline systems.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
COREQUISITES:
ADVISORIES:

ASSIGNED DISCIPLINES:
Automotive technology

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [X] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]
TRANSFER STATUS: CSU Transferable[X] UC/CSU Transferable[ ] Not Transferable[ ]
BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable
NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

OCCUPATIONAL (SAM) CODE: D

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X]  NUMBER REPEATS: Yes [ ]
REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Associate of Arts: Liberal Arts: Emphasis in Business and Technology(Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Demonstrate an ability to self-assess progress and development in a specific area and to further design and pursue a course of action based on the self-assessment.

2. Demonstrate mastery of diagnostic tools and equipment used for automotive repair.

3. Perform accurate vehicle safety inspections.

4. Analyze and diagnose automotive engines and related components for correct system operation.
5. Demonstrate proper lifting procedures.

COURSE OBJECTIVES:
1. Pass the SP-2 Mechanical Safety and Mechanical Pollution Prevention Test.
2. Chart the history and development of the modern automobile.
3. Describe basic theory and operating concepts of automotive systems, including electrical/electronics, chassis, powertrain, engine, fuel-control, heating/air conditioning, and hybrid electric vehicle systems.
4. Retrieve and interpret service and repair information.
5. Perform basic maintenance procedures associated with course content.
6. Apply learned safety concepts when servicing HEV’s, identifying the location of high voltage service disconnect switches, warning devices, and following proper safeguards and correct set-up procedures.

COURSE CONTENT:

LECTURE CONTENT:

A. Safety Instruction and SP-2 Mechanical Safety and Mechanical Pollution Prevention Test

B. Introduction to the automobile
   1. Safety in the Auto Lab
   2. Major automotive components
   3. Frame and platform designs
   4. Five engine systems
   5. Powertrain arrangements
   6. Hybrid Electric Vehicles (HEV)

C. Engine
   1. Engine components
      a. Engine block and related internal parts and components
      b. Cylinder heads and related components
   2. Operating fundamentals
      a. Science of moving air through the engine
      b. 4-stroke cycle
   4. Engine systems
      a. Air intake and fuel systems
         1. Science of fuels and internal combustion
         2. Air intake: Process and systems
            a. Mixing fuel with incoming air
            b. The science of air / fuel ratio and stoichiometric
      b. Oil and the lubrication system
         1. Science of mining and processing petroleum into lubricants
         2. Concepts of friction and need for lubrication
         3. Lubricant types and correct application to different vehicle systems
         4. Filtration systems
      c. The cooling system and the science of heat exchange
         1. Water circulation and air flow
         2. Radiators and heater cores
         3. The chemistry of coolants
      d. The exhaust system
         1. Process of removing exhaust gases from the engine
         2. Parts of the exhaust system

D. Electrical systems
1. Fundamentals and science of electricity and electronics
   a. Electrical flow
   b. The math of Ohm's law
   c. The science of magnetic induction
   d. Vehicle batteries
      1. Chemical concepts
      2. Jump-starting and auxiliary charging processes
   e. The starting and charging systems
      1. Electricity and magnetic induction
      2. Electro-mechanical concepts
   f. Ignition system
      1. Magnetic induction
      2. Ignition timing and the power stroke

E. Chassis and Steering
   1. Suspension designs and operation
      a. Independent suspension
         1. McPherson strut
         2. Short / long arm suspension and geometry
      b. Alignment and steering
         1. Steering geometry
         2. Steering gears and linkages
      c. Brakes
         1. Hydraulic systems operation
      d. Tires and wheels
         1. Tires
            a. Classifications
            b. Science of traction and tire design
            c. Theory of tire balance
            d. Tire tread depth measurement
            e. Tire Pressure Monitoring System (TPMS) concepts
         2. Wheels: Factory vs. aftermarket wheels

F. Powertrain
   1. Front- and rear-wheel drive
      a. Universal joints
      b. Constant velocity joints
      c. Four-wheel drive systems
      d. Automotive Transmissions
         1. Basic concepts, theory of power flow, and gear ratios
         2. Manual transmissions
         3. Continuously Variable Transmissions (CVT)
         4. Automatic transmissions

G. Heating, ventilation and air conditioning
   1. Theory of refrigeration and the science of heat exchange
   2. Heating system and refrigeration system components
   3. Air conditioning system refrigerant types: R12 vs. R-134

LABORATORY CONTENT:

A. Automobile basics
   1. Complete a Repair Order.
   2. Use Mitchell on-line to retrieve service information.
   3. Perform a vehicle visibility inspection.
   4. Replace wiper blades.
   5. Perform an on-ground vehicle safety check.
B. Engine and related systems.
   1. Check Engine Oil Level.
   2. Perform an oil change.
   3. Change an oil filter.
   4. Check and correct coolant level.
   5. Identify and inspect accessory drive belts.
   6. Perform an exhaust system inspection.
   7. Perform a cooling inspection.
   8. Pressure test a radiator cap.
   9. Replace an accessory v-belt.
  10. Replace an alternator V-belt/
  11. Replace a non-serpentine v-belt.
  12. Replace a serpentine drive belt.

C. Electrical systems.
   1. Remove and replace a headlight.
   2. Remove and replace a tail lamp bulb.

D. Chassis and steering.
   1. Raise and support a vehicle using jack stands.
   2. Raise vehicle using frame lift.
   3. Check brake master cylinder fluid level.
   4. Check clutch master cylinder fluid level.
   5. Check power steering fluid level.
   6. Inspect shock absorbers.
   7. Perform a tire inspection.
   8. Adjust tire pressure.
   9. Perform a vehicle tire rotation.
  10. Perform a vehicle tire wear inspection.
  11. Use a tire machine to remove and replace a tire.
  13. Perform a tire identification.
  14. Repair a tire puncture.

E. Powertrain.
   1. Check automatic transmission fluid level.
   2. Inspect suspension and steering linkage.
   3. Check fluid level in manual transmission.
   4. Check fluid in final drive (differential).

F. Heating ventilation air conditioning.
   1. Perform an air conditioning performance check.

METHODS OF INSTRUCTION:

A. Lecture:
B. Lab:
C. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
   Reading Assignments
   Required readings:
   Websites: Autoshop101.com, CTE Online.com, other topic specific websites as needed

   Out-of-class Assignments
   Students may be asked to complete various assignments in the library, on the Internet and on a
Writing Assignments

Students will
1. Create vehicle repair orders, perform math exercises for flat rate labor, parts, and materials totals.
2. Prepare for written and practicum exams through on-line research, outside reading assignments, lab activities.
3. Use on-line service and repair information to compare factory specifications with actual readings and measurements acquired during diagnostic activities.
4. Use on-line and owner’s manual sources to determine maintenance intervals, correct replacement fluids and levels.

METHODS OF STUDENT EVALUATION:

Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Report
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

Demonstration of Critical Thinking:

Students will
1. Diagnose and identify vehicle safety issues.
2. Analyze, confirm, and diagnose mechanical and other issues based on symptoms indicated on repair orders.
3. Relate diagnostic test results directly to component failures based on readings or measurements.

Required Writing, Problem Solving, Skills Demonstration:

Students will
1. Create vehicle repair orders, perform math exercises for flat rate labor, parts, and materials totals.
2. Prepare for written and practicum exams through on-line research, outside reading assignments, lab activities.
3. Use on-line service and repair information to compare factory specifications with actual readings and measurements acquired during diagnostic activities.
4. Use on-line and owner’s manual sources to determine maintenance intervals, correct replacement fluids and levels.

TEXTS, READINGS, AND RESOURCES:

TextBooks:

Other:
1. GWC Auto Tech work shirt
2. A basic hand tool set

LIBRARY:

Adequate library resources include: