Las Positas College
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Course Outline for AUTO L1

ADVANCED ENGINE PERFORMANCE

Effective: Fall 2016

I. CATALOG DESCRIPTION:
AUTO L1 — ADVANCED ENGINE PERFORMANCE — 5.00 units

Continuation of Automotive Technology A6 and A8 with an emphasis on diagnosis of electronic problems including computer controlled circuits/systems using schematics, diagnostic procedures and equipment. Students are strongly recommended to enroll in Automotive Lab concurrently.

3.00 Units Lecture 2.00 Units Lab

Prerequisite
AUTO A8 - Engine Performance
with a minimum grade of c

AUTO A6 - Electrical/Electronic Systems
with a minimum grade of c

Grading Methods:
Letter or P/NP

Discipline:

	MIN
Lecture Hours:	54.00
Lab Hours:	108.00
Total Hours:	162.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:
Before entering the course a student should be able to:

A. AUTOA8
1. Distinguish and explain the different types of fuel delivery systems;
2. Distinguish and explain the different types of ignition systems
3. Perform tests related to popular fuel systems used on current model cars;
4. Perform tests related to popular ignition systems used on current model cars
5. Formulate diagnostic patterns, and analyze gas readings to expedite proper repairs
6. Manipulate and use hand held diagnostic test equipment
7. Demonstrate proficient use of diagnostic information systems;
8. Explain theory and functionality of carburetors, throttle body, and port injectors;
9. Explain safety procedures and the handling of hazardous waste materials;
10. Maintain a clean and professional environment.

B. AUTOA6
1. Diagnose and repair basic automotive battery, starting, charging systems;
2. Use electrical test equipment for accurate diagnosis of electrical systems and sub-systems;
3. Use problem-solving skills to categorize systems faults in automotive circuits and make needed repairs;
4. Identify types of ignition systems;
5. Describe and evaluate fuel control circuits for proper operation;
6. Explain the fundamentals of electronic and electrical theories;
7. Conduct circuit and wire repairs;
8. Maintain a clean and professional environment.

IV. MEASURABLE OBJECTIVES:
Upon completion of this course, the student should be able to:

A. Obtain and interpret scan tool data, retrieve and record stored On Board Diagnostics (OBD) diagnostic trouble codes, and other On Board controllers;
B. Diagnose the causes of electrical failures or concerns resulting from malfunctions in the computerized control systems with or without diagnostic trouble codes;
C. Chart, inspect and test computerized engine control system sensors, Powertrain control module (PCM), actuators, and circuits using a graphing multi-meter (DMM)/digital storage oscilloscope (DSO), and perform necessary action;

D. Access and use service information to perform step-by-step diagnosis;
E. Evaluate complex electrical system problems;
F. Develop diagnostic paths using wiring schematics;
G. Diagnose malfunctions of electronic control systems causing vehicle performance problems, and determine necessary action;
H. Outline hazardous waste handling
I. Maintain a clean professional environment.

V. CONTENT:
A. On Board computer scan data
1. Retrieval of codes and data
a. Flash codes
b. Scanner codes
2. Interpretation of information
a. Factory set procedures
b. Develop own diagnostic procedures
B. Emission system diagnostics and testing
1. Perform flow chart testing, with codes, and without codes
2. Evaluate exhaust gas emission smog test results
3. Electronic pulse with modulation evaluation
C. Diagnostic patterns, and analyze scope readings
1. Digital storage oscilloscope usage
a. Scope connection
b. Pattern interpretation
D. Diagnostic service information
1. Access service information (electronic)
a. Application of information
2. Access service information (paper)
a. Application of information
3. Research labor time guides for work determined in diagnostics
E. Ignition timing
1. Inspection of adjustable systems
a. Proper operation of timing light
b. Follow factory procedures
c. Set timing to specifications
F. Explain theory and functionality of “OPEN/CLOSED loop systems
1. List theory of fuel flow delivery system in open loop status
a. Sensor contribution at operating temperatures
G. Exhaust system evaluation
1. Back pressure
a. Testing and diagnosis
2. Installation inspection
H. Emissions and performance
1. Explain impact of emissions system on vehicle performance
a. Diagnoses of power systems
I. Valve adjustments
1. Adjustment of hydraulic and solid lifters
J. Dynamometer
1. Set up and use of dynamometer
2. Safety procedures
3. List dynamic information obtained from testing (loaded mode)
K. Handling of hazardous waste materials
1. Storage and handling of gasoline
2. Storage and handling of diesel fuel
L. Professional environment
1. Safety glasses (clear lens) worn in all Laboratory areas
2. No loose clothing (coveralls strongly recommended)
3. Long Hair secured
4. No open toe shoes (safety shoes recommended)
5. Work areas maintained: clean free of debris and spills

VI. METHODS OF INSTRUCTION:
A. **Lab** - Student Hands-on laboratory activities and assignments
B. **Lecture** -

VII. TYPICAL ASSIGNMENTS:
A. Lecture based assignments
1. Lecture on 5 gas chemistry
B. Text reading
1. Read Chapter One
C. Lab based assignments
1. Perform 5 gas analysis on at least five vehicles

VIII. EVALUATION:
A. **Methods**

1. Exams/Tests
2. Quizzes
3. Home Work
4. Lab Activities

B. **Frequency**

1. Minimum two tests
a. Midterm
b. Final
2. Weekly Homework from text and lecture
3. Weekly reading from text
4. Weekly lab assignments

IX. TYPICAL TEXTS:

1. Hallembeak, Barry. *Automotive Fuels & Emissions Classroom Manual,*. 5 ed., Thomson Delmar Learning, 2014.
2. Hallembeak, Barry. *Automotive Fuels & Emissions Shop Manual.* 6 ed., Thomson Delmar Learning, 2014.
3. Halderman, James. *Automotive Maintenance and Light Repair.* 6 ed., Pearson, 2014.

X. OTHER MATERIALS REQUIRED OF STUDENTS:
   A. Safety glasses