Las Positas College
3000 Campus Hill Drive
Livermore, CA 94551-7650
(925) 424-1000
(925) 443-0742 (Fax)

Course Outline for AUTO 67A

ADV DIAG/TRBLSHTNG AUTO SYS

Effective: Fall 2008

I. CATALOG DESCRIPTION:
AUTO 67A — ADV DIAG/TRBLSHTNG AUTO SYS — 4.00 units

Continuation of Automotive Technology 60B and 61B 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. Prerequisites: Automotive 60B and 61B (both completed with a grade of "C" or higher).

3.00 Units Lecture 1.00 Units Lab

Prerequisite
AUTO 60B - Auto Electrics/Electronics II
with a minimum grade of C
and

AUTO 61B - AUTO FUEL EMISSIONS II
with a minimum grade of C

Strongly Recommended
-

Grading Methods:
Letter or P/NP

Discipline:

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

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 4

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

A. AUTO60B
1. Diagnose and repair basic automotive electrical systems;
2. Use basic electrical testing equipment in correctly diagnosing electrical problems on today's automobiles
3. Use problem solving skills to break down automotive circuits and troubleshoot them
4. Demonstrate the use of digital meters on electronic components and communication systems;
5. Identify fundamentals of electronic theories, Ohms Law;
6. Describe theory and practical application of multiplex communication systems;
7. Categorize safety, security systems diagnosis and repair
8. Outline body controller systems
9. List Ignition, emission and power train system
10. Research wiring System 1. Schematic reading and deciphering;J. Research wiring System
11. Review hazardous material handling;
12. Distinguish safe shop environment from unsafe environment.

B. AUTO61B
1. Obtain and interpret scan tool data, retrieve and record stored On Board Diagnostics (OBD) diagnostic trouble codes;
2. Diagnose the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with or without diagnostic trouble codes;
3. 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;
4. Access and use service information to perform step-by-step diagnosis;
5. Check and adjust ignition system timing and timing advance/retard (where applicable);
6. Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor and fuel

injection systems;
7. . Perform exhaust system back-pressure test, and determine necessary action;
8. Diagnose malfunctions of emission control systems causing vehicle performance problems, and determine necessary action;
9. Adjust valves on engines with mechanical or hydraulic lifters;
10. Operate vehicle dynamometer to perform emission testing, and engine performance/drivability issues;
11. Outline hazardous waste handling;
12. Distinguish safe shop environment from an unsafe 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. **Lecture** -
B. **Lab** - Student Hands-on laboratory activities and assignments
C. **Audio-visual Activity** - PowerPoint presentations, Mockup parts from automotive
D. **Discussion** - Group discussion

VII. TYPICAL ASSIGNMENTS:

A. Lecture based assignments 1. Text reading 2. Oral presentation 3. Class discussion 2. Lab based assignments 1. Completion of applied activities 2. Lab activity worksheet 3. Diagnosis and debugging 3. Student Lab work sheets with emphasis on Hands-on applications 4. Review of Lab sheets in both Lab and class settings 5. Text reading assignments 6. Class discussions of reading assignments 7. Demonstrations pertaining to reading assignments

VIII. EVALUATION:

A. **Methods**

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

B. **Frequency**

IX. TYPICAL TEXTS:

1. Hollembeak, Barry, *Automotive Fuels & Emissions Classroom Manual,.*, Thomson Delmar Learning, 2005.
2. Hollembeak, Barry, *Automotive Fuels & Emissions Shop Manual.*, Thomson Delmar Learning, 2005.

X. OTHER MATERIALS REQUIRED OF STUDENTS: