San Bernardino Valley College
Curriculum Approved: February 10, 2003
Last Updated: January 2003

I. COURSE DESCRIPTION:

A. Department Information:

Division:	Technical
Department:	Automotive
Course ID:	AUTO 066
Course Title:	ASE Alternative A-6, A-8, L-1 Prep or Certificate
Units:	4
Lecture:	3 Hours
Laboratory:	3 Hours
Prerequisite:	None

B. Catalog and Schedule Description:
Course provides students with the opportunity to either use this course as a prep course or an alternative for taking ASE A-6 Electrical, ASE A-8 Engine Performance, ASE L-1 Advanced Engine Performance tests. Student wishing to secure alternative ASE certificate will be asked to pay for each test taken. Test certificate will be the same as securing an ASE certificate. **STUDENT ENTERING THE COURSE MUST HAVE ONE-YEAR EXPERIENCE/EDUCATION IN THE AUTOMOTIVE ENGINE PERFORMANCE AREA.**

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

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course, the student will be able to:

A. Set-up and use Logic Probes, DVOM, Self Power Test Lights.
B. Evaluate open and short circuits in the electrical system.
C. Diagnose electrical circuits, using wiring diagrams.
D. Demonstrate ability to perform varies electrical circuits tests, voltage drop, components resistance testing, and circuit ampere draw tests.
E. Diagnose engine-mechanical systems using a vacuum gauge, compression tests, and leak down test.
F. Perform CO method for adjustments of engine idle using lean best idle and propane enrichment method.
G. Analyze ignition related problems using an oscilloscope/engine analyzer.
H. Interpret five-gas reading to diagnose emissions failures.
I. Set-up and operation of a Digital Storage Oscilloscope (DSO).
J. Demonstrate fault code retrieval, both OBD I and OBD II systems, and evaluate codes using fault trees diagnostic materials.
K. Explain the “dynamics” of the different sensors/actuators inputs and the PCM responses to a vacuum leak.
L. Monitor fuel related problem using a Digital Storage Oscilloscope (DSO).
M. Explain how the PCM determines engine load values.
N. Diagnose fuel injector m/s duration at both idle and 2500 RPM and the effects on emissions.
O. Demonstrate the various functions of the scanners, PC base and hand held.

IV. COURSE CONTENT:

A. Shop safety
   1. Hazardous materials
   2. Material Safety Data Sheets
   3. Machinery Hazards
   4. Dynamometer safety and operation
B. Electrical\Electronic
   1. Meters, test lights, and logic probes
   2. Open circuits
   3. Short circuits

4. Grounded circuits
5. Intermittent electrical problems
6. Power and ground distribution
7. Voltage drops

C. Engine Performance
1. Four-cycle engine theory
2. Testing and diagnosis
3. Fuel management
4. Fuel management testing and diagnosis
5. Ignition theory
6. Ignition testing and diagnosis
7. On-board computer theory
8. PCM testing and diagnosis

D. Advanced Engine Performance
1. Computer basics
2. Diagnostic tools
3. Sensors
4. Feedback carburetors
5. Fuel injectors
6. Scanners
7. OBD II generic terminology
8. Common abbreviations
9. OBD II DTC definitions

V. METHODS OF INSTRUCTION:

A. Lecture
B. Read textbook and shop manuals
C. Class and group discussion
D. Computer aided manufacturer's CD Rom instructions
E. Lab demonstrations

VI. TYPICAL ASSIGNMENTS:

A. Read assigned chapters and answer questions at end of each chapter.
Typical Questions:
1. What is the different between Open, Short, and Ground circuits?
2. When testing ignition coils, what tests and meters are used?
3. How is injector pulse width measure?

B. Class discussion:
Typical Topics:
1. Ohm's Law Formula
2. Fuel Management Systems
3. Sensors and Actuators

C. Computer, CD Power Points presentations
Typical Assignment: Take notes, outline key points of discussion

D. Lab assignments: Complete task sheets
Typical Assignments:
1. Diagnose the charging system for undercharge, no-charge, or overcharge.
2. Inspect and service fusible links, circuit breakers, and fuses in an automotive electrical circuit.
3. Test and diagnose the lighting systems.
4. Diagnose and service fuel-related sensors using a scan tool.
5. Inspect and test a carbureted fuel system.
6. Test and service the intake air control system.
7. Diagnose drive ability concerns/symptoms using an exhaust gas analyzer.
8. Inspect and test computerized and electronic ignition system.

9. Retrieve Diagnostic Trouble Codes (DTC) analyzer codes and perform necessary action.

VII. EVALUATION(S):

A. Methods of evaluation:
1. Pretest start of class
2. Quizzes
3. Notebooks with all labs assignments completed turn in at the end of the semester.
4. Final examinations for each section (must pass by 70% to receive certificate)
Typical Questions:
a) List at least four circuit protection devices and where they are used and found.
b) What are the differences between Volts, Amps, and Resistance, show an example of Ohm's Law and how it is used?
c) Describe the four strokes of an internal combustion engine.
d) To maintain proper timing, electronic ignition systems use input from what sensors?
e) Excessive combustion chamber temperature will cause the loss of control of which of the five gases?
f) What sensors input must the computer see to enter closed loop?

B. Frequency of evaluation:
1. Weekly quizzes
2. Final examinations for each section
3. Required lab assignments checked and graded at the end of each section

VIII. TYPICAL TEXT(S):

S. Myron Maurseth, Automotive Electrical and Electronic Systems, California Institute of Automotive Technology, San Marcos, California, 2002
S. Myron Maurseth, Engine Performance, California Institute of Automotive Technology, San Marcos, California, 2002
S. Myron Maurseth, Systematic Diagnosis & Repair Procedures, California Institute of Automotive Technology, San Marcos, California, 2002
James D. Halderman, Advanced Engine Performance Diagnosis, 2nd Edition, Prentice Hall, Columbus, Ohio, 2001

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: Safety equipment and adequate clothing