San Bernardino Valley College
Curriculum Approved: January 27, 2003
Last Updated: December 2002

I. COURSE DESCRIPTION:

A. Department Information:

Division:	Technical
Department:	Automotive
Course ID:	AUTO 067
Course Title:	Automotive Emissions
Units:	4
Lecture:	3 Hours
Laboratory:	3 Hours
Prerequisite:	None

B. Catalog and Schedule Description:
All technicians wishing to become state licensed smog inspection technician must take the Basic Area Clean Air Car Course (68 Hours) and Enhanced Clean Air Car Course (28 Hours). **STUDENTS 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 the BAR 90 and BAR 97 test equipment to perform both two-speed idle and loaded mode emission testing.
B. Evaluate laws and regulations pertaining to emission testing.
C. Perform vehicle emission testing procedures for Basic Area Program.
D. Analyze theory and operation of On-Board Diagnostic II (OBD II) engine performance system.
E. Choose and formulate repair procedures for NO_x emissions.
F. Set-up and operate a Digital Storage Oscilloscope (DSO).
G. Evaluate catalytic converter operation, perform efficiency testing procedures.
H. Prepare vehicles for testing in the Enhanced Area Program, using the BAR 97 EIS.

IV. COURSE CONTENT:

A. Shop Safety
   1. Hazardous Materials
   2. Material Safety Data Sheets
   3. Machinery Hazards
   4. Dynamometer Safety and Operation
B. Program Description
   1. General Information
   2. Station Definitions
   3. Station Licensing Requirements
   4. Equipment Requirements
   5. Equipment Maintenance
   6. Licensed Technician Requirement
   7. Station Operation
   8. Station Audits
   9. Repair Assistance, Cost Waivers
   10. Customer Authorization
C. Inspection Procedures
   1. Pre-inspection Procedures
   2. Vehicle Identification
   3. Visual Inspection Definitions

4. Emission Measurement Test
5. Emission Control Function Test
6. Smog Check Inspection Results

D. Repair and Retest Procedures
1. Vehicle Warranty
2. Vehicle Repair
3. After Repair Testing
4. Referee Services
5. Miscellaneous

E. Appendix
1. A though L

F. History of OBD
G. Basic OBD Parameters and Strategies
H. History of OBD II System
I. MIL Strategy and Diagnostic Trouble Codes
J. Enhanced Monitors
K. Comparison of OBD I to OBD II
L. Fuel Trim Strategies
M. Testing for Oxides of Nitrogen
1. Specification of No_x
2. Under a Heavy Load
3. Cruise Conditions
4. Carbon Deposits in Combustion Chamber

O. Set-up and Operation of a Digital Storage Oscilloscope (DSO)
1. Waveform Triggers
2. Scope Coupling
3. Amplitude
4. Shape
5. Repetitive and Synch Pulses
6. Frequency
7. O_2 Sensor Testing

P Catalytic Converter Operation
1. Diagnosis
2. Testing

V. METHODS OF INSTRUCTION:

A. Lecture
B. Computer assisted instruction and shop manuals
C. Class and group discussion
D. Manufacturer's video instruction
E. Daily lab demonstrations

VI. TYPICAL ASSIGNMENTS:

A. Read assigned chapters and answer questions at the end of each chapter.
Typical Questions:
1. What is the ENABLE CRITERIA for closed loop on an On Board Diagnostics II system?
2. What must be met for an OBD II system to see a complete Warm-up Cycle?

B. Class discussion:
Typical Topic: Laws and Regulations (Smog Check Inspection Manual, Business and Professions Codes)

C. Videotapes
Typical Assignment: Take notes, outline key points of discussion

D. Lab assignments - Complete task sheets
Typical Assignments:
1. Testing of catalytic converter efficiency in accordance with Bureau of Automotive Repair (BAR) standards.
2. Connect and setup of Digital Storage Oscilloscope (DSO) and test 0_2 Sensor.
3. Perform Loaded Mode Emission Test (BAR 97).

VII. EVALUATION(S):

A. Methods of evaluation:
1. Pretest start of class (supply by State of California)
2. Quizzes (Multiple Choice, Essay)
3. Basic Area Clean Air Car Course (68 Hours)
One open book test and one closed book test, supply by State of California, multiple choice, must pass by 70% to receive certificate.
4. Enhanced Clean Air Car Course (28 Hours) Test supply by State of California, must pass by 70% to receive certificate.
Typical Questions:
a) List the three types of charcoal canister purge control system and describe their operation.
b) What are the three catalysts in a three-way catalytic converter? Explain the chemical reaction of each when HC and CO is introduced.

B. Frequency of evaluation
1. Weekly quizzes
2. Final examination, two for the 68-hour class after the 12th week, one for the 28-hour class at the end of the semester or 18th week
3. Required weekly lab assignments

VIII. TYPICAL TEXT(S):

Consumer Affairs, Bureau of Automotive Repair, Smog Check Inspection Manual, Revision 6, Sacramento, California, Consumer Affairs, 2002
Consumer Affairs, Bureau of Automotive Repair, Clean Air Car Course Student Work Book, Sacramento, California, Consumer Affairs, 1993
Aspire, Understanding OBD II, Aspire, 2000
James D. Halderman, Advanced Engine Performance Diagnosis, 2nd Edition, Columbus, Ohio, Prentice Hall, 2001
John Forro, Waveform Reference Manual, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Safety equipment and adequate clothing