BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

AUT 31 - Engine Performance and Emission Controls Lab **5 Unit(s)**

Prerequisite(s): AUT 41 (or concurrent enrollment)
Co-requisite(s): AUT 30
Recommended Prep: AUT 1

Transfer Status: CSU
255 hours Lab

In this course, students will develop and demonstrate the hands-on skills needed to diagnose and repair the ignition, fuel, engine management, and emission control systems used in today's vehicles. The student will also perform various emission control inspections (Smog Check) and perform diagnosis and repair of Smog Check failures, as per California Bureau of Automotive Repair (BAR) standards. This instruction will help prepare the student to take the California State Smog Check Inspector and Repair Technician Licensing Exams.

II. **OBJECTIVES**

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

A. Diagnose and repair various vehicle ignition system problems, using industry-approved tools and techniques.
B. Diagnose and repair various fuel system problems, using industry- approved tools and techniques.
C. Diagnose and repair various computer-controlled engine management system problems, using industry-approved tools and techniques.
D. Diagnose and repair various emission control system problems, using industry-approved tools and techniques.
E. Demonstrate how to perform the three types of emission control system inspections (Smog Check) according to California BAR standards.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lab

Topics	Hours
1. Testing and repair of conventional and electronic automotive ignition systems.	50.00
2. Testing and repair of various types of automotive fuel systems, to include throttle body injection, multi-port fuel injection, and direct injection.	50.00
3. Testing and repair of various types of computer-controlled engine management systems, to include speed-density and mass airflow types. This section will also include working with On-Board Diagnostics 2nd Generation (OBDII) and Controller Area Network (CAN) type systems.	50.00
4. Hands-on practice, performing emission control inspections (Smog Check) while adhering to California BAR standard. Practice will include the three current types of inspections: Two-Speed Idle (TSI), Acceleration Simulation Mode (ASM), and OBD Inspection System (OIS). Students will also perform diagnosis of Smog Check failures.	55.00

5.	Testing and repair of various emission control sytems, to include Positive Crankcase Ventilation (PCV), Evaporative Emission Control (EVAP), Exhaust Gas Recirculation (EGR), Air Injection Reactor (AIR), and catalytic converters.	50.00
	Total Hours	255.00

IV. METHODS OF INSTRUCTION

A. Instructor Demonstrations
B. Collaborative Group Work
C. Problem-Solving Sessions
D. Reading Assignments
E. Laboratory Experiments

V. METHODS OF EVALUATION

A. Class participation
B. Lab Projects
C. Final Examination
D. Performance Examinations
E. Practical Evaluations
F. Laboratory evaluation will be by observation and the number of completed jobs which are documented by job sheets and a hands-on performance lab final.

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
   1. Read the chapter on "Electronic Fuel Injection" in the Engine Performance Shop Manual. After studying this material, be prepared to demonstrate an injector balance test and a fuel pressure test.
   2. Read the chapter on "Emission Control System Diagnosis and Service" in the Engine Performance Shop Manual. After studying this material, be prepared to demonstrate how to test a catalytic converter and an exhaust gas recirculation (EGR) system.

B. Writing Assignments
   1. Perform a Smog Check Inspection in the lab. Complete a customer repair order following the standards set forth by the California BAR.
   2. In the AUT31 Lab Worksheets Book, complete the "OBDII Lab Worksheet". The final requirement of this worksheet is to look up the OBDII Drive Cycle Enable Criteria, for the vehicle that you are working on. Describe, in writing, the difficulties that you might have in completing the drive cycle, such as traffic conditions, terrain, vehicle conditions, time required, etc. This writing assignment must be at least 100 words.

C. Out-of-Class Assignments
   1. Go to an automotive repair facility of your choice (dealership, independent shop, or chain store) to observe the shop operations including the flow of repair orders, the parts ordering process, the technicians at work, etc. Post a blog of at least 300 words, describe your experiences at this facility. Read and comment on at least one other blog.
   2. Pick a day when the BAR Smog Check Referee is working at the B.C. Skyway Center, and observe the work being performed. Post a blog of at least 300 words, comparing and contrasting the Referee to a Smog Check Station. Read and comment on at least one other blog.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

A. Pickerell, Ken. Today's Technician Automotive Engine Performance Classroom & Shop

Manuals. 6th Edition. Delmar Cengage Learning, 2014.

Materials Other Than Textbooks:

A. Safety glasses

Created/Revised by: Bradley Dressen
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