

Course Outline of Record

1. Course Code: AUTO-054E
2.
 - a. Long Course Title: Smog Check Diagnostic & Repair Technician Training
 - b. Short Course Title: SMOG DIAG & REPAIR
3.
 - a. Catalog Course Description:

This course provides the student with advanced level training in the diagnosis and repair of Smog Check failures. It focuses on areas of electrical/electronic systems and engine and emission control performance. Successfully completing this training is one of the requirements to qualify for the state licensing examination for the Smog Check Repair Technician License.
 - b. Class Schedule Course Description:

This course provides the student with advanced level training in the diagnosis and repair of Smog Check failures. It focuses on areas of electrical/electronic systems and engine and emission control performance. Successfully completing this training is one of the requirements to qualify for the state licensing examination for the Smog Check Repair Technician License.
 - c. Semester Cycle (*if applicable*): Every semester
 - d. Name of Approved Program(s):
 - AUTOMOTIVE EMISSIONS Certificate of Achievement
4. Total Units: 3.00 Total Semester Hrs: 90.00
 Lecture Units: 2 Semester Lecture Hrs: 36.00
 Lab Units: 1 Semester Lab Hrs: 54.00
 Class Size Maximum: 21 Allow Audit: No
 Repeatability No Repeats Allowed
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:

Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)

 Advisory: AUTO 014A
 Prerequisite: AUTO 054D or
 Corequisite: AUTO 054D
6. Textbooks, Required Reading or Software: (*List in APA or MLA format.*)
 - a. Keiser, Mark (2014). *BAR Specified Diagnostic & Repair Training, A6, A8, LI* Smog Tech Institute. ISBN: 9781323048900
 College Level: Yes
 Flesch-Kincaid reading level: 13
 - b. Other new test books or resource material that may be required by the State of California, Department of Consumer Affairs, Bureau of Automotive Repair.
7. Entrance Skills: *Before entering the course students must be able:*
 - a. Demonstrate skills and knowledge necessary to understand automobile engine computer control systems at the relationship to drivability problems.
 - AUTO 054D - Demonstrate skill in the operation, diagnosis, and repair of automotive engine computer systems.
 - b. Develop qualifications necessary to gain and maintain employment as an automotive technician.
 - c. Demonstrate an understanding of the relationship between proper engine operation and the environment.
 - AUTO 054D - Demonstrate an understanding of the relationship between proper engine operation and the environment.
 - d. Effectively use and understand shop/service manuals, specifications, and electronic data retrieval systems as related to automotive engine computer systems.

- AUTO 054D - Use and understand shop/service manuals, specifications, and electronic data retrieval systems as related to automotive engine computer systems.

8. Course Content and Scope:

Lecture:

A. General Automotive

1. Describe and demonstrate personal, shop, equipment, and vehicle safety practices.
2. Explain the causes and effects of air pollution as it relates to the automotive industry.
3. Explain the standards of practice pertaining to Smog Check licensure.
4. Locate, assess and apply vehicle service / repair information, in the process of Smog Check diagnosis and repair.
5. Employ appropriate diagnostic and repair processes based on the customer's complaint, the cause of inspection failure, or vehicle data / information.
6. Establish a level of priority with respect to the repair of a Smog Check failure using inspection and vehicle data / information.

B. Electrical/Electronic Systems

1. Describe principles of electricity and electronics.
2. Define electrical terms of watts, voltage, current and resistance.
3. Describe and identify the types of automotive electrical circuits (series, parallel, and series/parallel).
4. Describe and identify the types of electrical and electronic components used in computer controlled automotive systems.
5. Describe theory, design and operation of automotive electrical and electronic systems.
6. Demonstrate full understanding of electrical principals in detecting defects in electrical/electronic circuits, including, but not limited to, continuity tests, resistance tests, current/amperage tests, voltage drop tests.
7. Interpret electrical wiring diagrams and schematics to diagnose automotive electrical and electronic systems.
8. Employ various types of test equipment, including but not limited to a digital multi-meter (DMM) and a digital storage oscilloscope (DSO).

C. Engine and Emission Control Performance

1. Describe engine theory, design, and operation.
2. Describe the theory, design and operation of induction and exhaust systems.
3. Describe the theory, design and operation of fuel systems.
4. Describe the theory, design and operation of ignition systems.
5. Describe theory, purpose, design and operation of emission control systems, including, but not limited to, crankcase controls, fuel evaporative controls, air injection, exhaust gas recirculation, catalyst and other exhaust gas after treatment systems, and integrated emission control management strategies, such as spark control and variable valve timing.
6. Describe the exhaust byproducts of internal combustion and define the primary emissions resulting from this combustion process. (oxygen, carbon dioxide, carbon monoxide, hydrocarbon, oxides of nitrogen, sulphur dioxide, particulate matter).
7. Explain the relationship of the air/fuel ratio to the combustion process and the resulting emissions (stoichiometric, rich, lean).
8. Analyze exhaust gas readings to determine the best diagnostic strategy (4 - 5 gas analysis).
9. Employ engine and emission control diagnostic test equipment, including, but not limited to, cylinder compression gauge, cylinder leak down tester, fuel pressure gauge, ignition oscilloscope, timing light, pressure/vacuum gauge, DMM, OBD diagnostic scan tool, DSO, and exhaust gas analyzer.
10. Diagnose engine mechanical malfunctions or defects and determine appropriate repairs.
11. Diagnose induction and fuel system malfunctions or defects and determine appropriate repairs.
12. Diagnose emission control systems malfunctions/defects and determine appropriate repairs. Including, but not limited to, crankcase controls, fuel evaporative controls, exhaust gas recirculation, secondary air, and catalytic converter efficiency.

13. Diagnose ignition system malfunctions or defects and determine appropriate repairs.
14. Identify root or underlying causes of engine and emission control malfunctions and differentiate between mechanical, electrical/electronic and fuel system problems and determine appropriate repairs.
15. Describe the theory, design and operation of computerized engine and emission control management systems, OBDI and OBDII.
16. Identify computerized engine and emissions control systems, subsystems and components.
17. Describe OBDII monitors: catalyst efficiency, misfire detection, fuel system, heated exhaust gas oxygen sensors, EGR, and comprehensive component monitors, evaporative emissions, secondary air injection, thermostat, and PCV monitor.
18. Describe the OBDII system modes of operation, modes 1-9.
19. Evaluate a vehicle's OBD data, to determine the systems operational status and condition, including, but not limited to, supported monitors, monitor enabling criteria, monitor readiness, generic and vehicle manufacturer fault codes, freeze frame data, and fuel control.
20. Demonstrate comprehensive knowledge and ability in using an OBDII diagnostic scan tool to detect various engine and emission control malfunctions.
22. Demonstrate comprehensive knowledge and ability in using a DSO to detect various system/component malfunctions.
23. Evaluate a vehicle's OBD data to verify proper engine / emission controls management functionality- repair verification.

Lab: *(if the "Lab Hours" is greater than zero this is required)*

1. Demonstrate personal, shop, equipment, and vehicle safety practices.
2. Employ various types of test equipment, including but not limited to a digital multi-meter (DMM) and a digital storage oscilloscope (DSO).
3. Analyze exhaust gas readings to determine the best diagnostic strategy (4 - 5 gas analysis).
4. Employ engine and emission control diagnostic test equipment, including, but not limited to, cylinder compression gauge, cylinder leak down tester, fuel pressure gauge, ignition oscilloscope, timing light, pressure/vacuum gauge, DMM, OBD diagnostic scan tool, DSO, and exhaust gas analyzer.
5. Diagnose engine mechanical malfunctions or defects and determine appropriate repairs.
6. Diagnose induction and fuel system malfunctions or defects and determine appropriate repairs.
7. Diagnose emission control systems malfunctions/defects and determine appropriate repairs. Including, but not limited to, crankcase controls, fuel evaporative controls, exhaust gas recirculation, secondary air, and catalytic converter efficiency.
8. Diagnose ignition system malfunctions or defects and determine appropriate repairs.
9. Demonstrate comprehensive knowledge and ability in using an OBDII diagnostic scan tool to detect various engine and emission control malfunctions.
10. Demonstrate comprehensive knowledge and ability in using a DSO to detect various system/component malfunctions.
11. Evaluate a vehicle's OBD data to verify proper engine / emission controls management functionality- repair verification.

9. Course Student Learning Outcomes:

1.

Demonstrate proper personal, shop, equipment and vehicle safety practices.

2.

Diagnose and repair SMOG check failures related to each of the following systems: electrical, engine and emission control.

10. Course Objectives: *Upon completion of this course, students will be able to:*

a. Demonstrate proper personal, shop, equipment and vehicle safety practices.

b. Diagnose and repair SMOG check failures related to each of the following systems: electrical, engine and emission control.

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*

- a. Collaborative/Team
- b. Demonstration, Repetition/Practice
- c. Discussion
- d. Laboratory
- e. Lecture
- f. Participation
- g. Technology-based instruction

Other Methods:

Reading assignments in textbook and technical manuals

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 90.00

Outside Class Hours: 72.00

a. Out-of-class Assignments

1. Homework from required text: chapters per week from both classroom and shop manuals.
2. Completion of 3 SP2 safety tests.
3. Assigned readings and written summaries from selected instructor handouts.
4. Written summaries and analysis of assigned websites.
5. Worksheets provided by instructor.
6. Must develop teamwork skills through assigned special projects.

b. In-class Assignments

1. Readings from required text: chapters per week from both classroom and shop manuals.
2. Assigned readings and written summaries from selected instructor handouts.
3. Written summaries and analysis of assigned websites.
4. Vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
5. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.
6. Must develop teamwork skills through lab activities.

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*

- College level or pre-collegiate essays
Short essays on engine or sub-system operation
- Written homework
- Reading reports
- Laboratory projects
- Group activity participation/observation
- True/false/multiple choice examinations
- Mid-term and final evaluations

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- Student participation/contribution
- Student preparation
- Oral and practical examination

14. Methods of Evaluating: Additional Assessment Information:

One instructor and four BAR generated multiple choice test with passing score of 70% for BAR certificate Notebook

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

PO-BS Problem Solving

Use background information in a subject to understand the nature of a problem and transfer information to new problems accordingly.

Identify what isn't known, but needs to be known in order to solve a problem (depending on the problem domain, reading and/or mathematical skills are helpful).

IO - Scientific Inquiry

Collect and analyze data. Skills of data collection include an understanding of the notion of hypothesis testing and specific methods of inquiry such as experimentation and systematic observation.

IO - Critical Thinking and Communication

Apply principles of logic to problem solve and reason with a fair and open mind.

Summarize, analyze, and interpret oral and written texts, with the ability to identify assumptions and differentiate fact from opinion.

16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year
CSU	CSU Fullerton			

17. Special Materials and/or Equipment Required of Students:

1. 3-ring binder
2. Safety glasses meeting ANSI Z87.1 standards

18. Materials Fees: Required Material?

Material or Item	Cost Per Unit	Total Cost
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19. Provide Reasons for the Substantial Modifications or New Course:

The Bureau of Automotive Repair (BAR) changed the requirements for the Smog Check training.

- a. Cross-Listed Course (*Enter Course Code*): *N/A*
- b. Replacement Course (*Enter original Course Code*): AUTO-054C

21. Grading Method (*choose one*): Letter Grade Only

22. MIS Course Data Elements

- a. Course Control Number [CB00]: CCC000583740
- b. T.O.P. Code [CB03]: 94840.00 - Alternative Fuels and Adv
- c. Credit Status [CB04]: D - Credit - Degree Applicable
- d. Course Transfer Status [CB05]: C = Non-Transferable
- e. Basic Skills Status [CB08]: 2N = Not basic skills course
- f. Vocational Status [CB09]: Advanced Occupational
- g. Course Classification [CB11]: Y - Credit Course
- h. Special Class Status [CB13]: N - Not Special

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- i. Course CAN Code [CB14]: N/A
- j. Course Prior to College Level [CB21]: Y = Not Applicable
- k. Course Noncredit Category [CB22]: Y - Not Applicable
- l. Funding Agency Category [CB23]: Y = Not Applicable
- m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (if program-applicable): AUTOMOTIVE EMISSIONS

Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment

First Year: 21

Third Year: 21

24. Resources - Faculty - Discipline and Other Qualifications:

- a. Sufficient Faculty Resources: Yes
- b. If No, list number of FTE needed to offer this course: N/A

25. Additional Equipment and/or Supplies Needed and Source of Funding.

N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. (Explain:)

N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES

Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Douglas Hugh Redman Origination Date 01/03/17