

# AUTO 054E: SMOG CHECK DIAGNOSTIC & REPAIR TECHNICIAN

**Originator**

dredman

**Co-Contributor(s)****Name(s)**

Anderson, Dorothy

**Justification / Rationale**

The Automotive Faculty are reviewing and/or updating this course to assure compliance with local, State, and Federal regulations; support consistency within the curriculum; practice relevance regarding automotive industry and community; and to make improvements that will strengthen the learning environment this course creates thus benefiting the learners.

**Effective Term**

Fall 2022

**Credit Status**

Credit - Degree Applicable

**Subject**

AUTO - Automotive Technology

**Course Number**

054E

**Full Course Title**

Smog Check Diagnostic &amp; Repair Technician

**Short Title**

SMOG DIAG &amp; REPAIR

**Discipline****Disciplines List**

Automotive Technology

**Modality**

Face-to-Face

**Catalog Description**

This course is designed to provide students with fundamental knowledge of engine and emission control theory, design and operation. Students who successfully complete this training at a BAR-certified school will have met the BAR's training requirements to qualify to take the Smog Check Inspector state licensing examination.

**Schedule 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. Prerequisite: AUTO-054D, or concurrent enrollment Advisory: AUTO-014A

**Lecture Units**

2

**Lecture Semester Hours**

36

**Lab Units**

1

**Lab Semester Hours**

54

**In-class Hours**

90

**Out-of-class Hours**

72

**Total Course Units**

3

**Total Semester Hours**

162

**Prerequisite Course(s)**

AUTO 054D, or concurrent enrollment

Advisory: AUTO 014A

**Required Text and Other Instructional Materials****Resource Type**

Book

**Open Educational Resource**

No

**Author**

Keiser, Mark

**Title**

BAR Specified Diagnostic Repair Training

**Publisher**

Smog Tech Institute

**Year**

2014

**College Level**

Yes

**Flesch-Kincaid Level**

13

**ISBN #**

9780136793694

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**Resource Type**

Web/Other

**Description**

Other new test books or resource material that may be required by the State of California, Department of Consumer Affairs, Bureau of Automotive Repair.

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**For Text greater than five years old, list rationale:**

This text meets the State of California requirements for SMOG training.

**Class Size Maximum**

21

**Entrance Skills**

Fuel and emission system diagnostic skills.

**Requisite Course Objectives**

AUTO 014A-Learners will demonstrate engine diagnosis by applying manufacturer provided repair information while diagnosing engine mechanical, engine management systems faults and computer input and output sensor faults.

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**Entrance Skills**

Fuel and emission system familiarization.

**Requisite Course Objectives**

AUTO 014A-Learners will characterize relationships between fuel, ignition, air induction, exhaust and emissions system to interpret unique faults pertaining to each individual system. Once the student has distinguished which system is at fault, sequence applicable diagnostic repair procedures.

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**Entrance Skills**

List the top 5 automotive emissions systems and describe their operation.

**Requisite Course Objectives**

AUTO 054D-Describe the operation of vehicle emission control system components.

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**Entrance Skills**

Describe the relationship between automotive emissions and the environment.

**Requisite Course Objectives**

AUTO 054D-Analyze the relationship between proper engine operation and the environment.

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**Course Content****A. General Automotive**

1. Describe and demonstrate personal, shop, equipment, and vehicle safety practices, SP2.
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/ampereage 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 Content

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.

### Course Objectives

	<b>Objectives</b>
Objective 1	Demonstrate proper personal, shop, equipment and vehicle safety practices.
Objective 2	Apply research skills required to diagnose and repair SMOG check failures related to each of the following systems: electrical, engine and emission control.
Objective 3	Successfully complete SP2 safety training.

**Student Learning Outcomes**

**Upon satisfactory completion of this course, students will be able to:**

Outcome 1	Demonstrate proper personal, shop, equipment and vehicle safety practices.
Outcome 2	Apply research skills required to diagnose and repair SMOG check failures related to each of the following systems: electrical, engine and emission control.

**Methods of Instruction**

Method	Please provide a description or examples of how each instructional method will be used in this course.
Demonstration, Repetition/Practice	Lab activities.
Technology-based instruction	Learning how to use the State Smog check machine.
Collaborative/Team	Lab activities and exam study sessions.
Participation	Lecture/discussions.
Lecture	Discussion/participation.
Laboratory	State required lab activities.

**Methods of Evaluation**

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
College level or pre-collegiate essays	Short essays on engine or sub-system operation.	In and Out of Class
Self-paced testing	State practice exam.	In and Out of Class
Student participation/contribution	Lecture.	In Class Only
Mid-term and final evaluations	State evaluations.	In Class Only
Tests/Quizzes/Examinations	Practice quizzes.	In and Out of Class
Laboratory projects	Performing a SMOG inspection.	In Class Only
Written homework	Based on text.	In and Out of Class

**Assignments**
**Other 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.

**Other Out-of-class Assignments**

1. Homework from required text: chapters per week from both classroom and shop manuals. (1 hr per week)
2. Completion of 3 SP2 safety tests. (4hrs total)
3. Assigned readings and written summaries from selected instructor handouts. (1 hr per week)
4. Written summaries and analysis of assigned websites. (8hrs total)
5. Worksheets provided by instructor. (1 hr per week)
6. Must develop teamwork skills through assigned special projects. (8hrs total)

**Grade Methods**

Letter Grade Only

**MIS Course Data**
**CIP Code**

47.0614 - Alternative Fuel Vehicle Technology/Technician.

**TOP Code**

094840 - Alternative Fuels and Advanced Transportation Technology

**SAM Code**

B - Advanced Occupational

**Basic Skills Status**

Not Basic Skills

**Prior College Level**

Not applicable

**Cooperative Work Experience**

Not a Coop Course

**Course Classification Status**

Credit Course

**Approved Special Class**

Not special class

**Noncredit Category**

Not Applicable, Credit Course

**Funding Agency Category**

Not Applicable

**Program Status**

Program Applicable

**Transfer Status**

Transferable to CSU only

**General Education Status**

Y = Not applicable

**Support Course Status**

N = Course is not a support course

**Allow Audit**

Yes

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

**Approvals****Curriculum Committee Approval Date**

3/17/2022

**Academic Senate Approval Date**

3/24/2022

**Board of Trustees Approval Date**

4/22/2022

**Chancellor's Office Approval Date**

5/31/2022

**Course Control Number**

CCC000583740

**Programs referencing this course**

Automotive Air Conditioning Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=104>)  
Automotive Emissions Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=106>)  
Automotive Braking Systems Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=109>)  
Automotive Light and Medium Duty Diesel Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=111>)  
Automotive Steering, Suspension, Alignment Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=112>)  
Automotive Introductions Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=201>)  
Advanced Transportation Technologies AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=44>)  
Advanced Transportation Technologies AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=45>)  
Automotive Technology AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=57>)