

AUTO 158.1 Course Outline as of Fall 2022**CATALOG INFORMATION**

Dept and Nbr: AUTO 158.1 Title: ENG PERF/EMISSION CTRL

Full Title: Automotive Engine Performance & Emission Control

Last Reviewed: 2/14/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	7.00	Lecture Scheduled	6.00	17.5	Lecture Scheduled	105.00
Minimum	7.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 210.00

Total Student Learning Hours: 367.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: AUTO 153

Catalog Description:

In this course, students will explore the operation, troubleshooting and repair of the ignition, fuel and emission control systems of late model automobiles through lecture, demonstration and practical lab. Emphasis on safety and the proper use of tools and diagnostic equipment. Course prepares students to pass the Automotive Service Excellence (ASE) A8 Engine Performance Certification Exam and enter the automotive trade as an apprentice level technician specializing in engine performance and emission control. This course conforms with ASE Education's instructional and content guidelines.

Prerequisites/Corequisites:**Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100 and Course Completion of AUTO 56

Limits on Enrollment:**Schedule of Classes Information:**

Description: In this course, students will explore the operation, troubleshooting and repair of the ignition, fuel and emission control systems of late model automobiles through lecture,

demonstration and practical lab. Emphasis on safety and the proper use of tools and diagnostic equipment. Course prepares students to pass the Automotive Service Excellence (ASE) A8 Engine Performance Certification Exam and enter the automotive trade as an apprentice level technician specializing in engine performance and emission control. This course conforms with ASE Education's instructional and content guidelines. (Grade Only)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100 and Course Completion of AUTO 56

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area	Effective:	Inactive:
CSU GE:	Transfer Area	Effective:	Inactive:
IGETC:	Transfer Area	Effective:	Inactive:
CSU Transfer:		Effective:	Inactive:
UC Transfer:		Effective:	Inactive:

CID:

Certificate/Major Applicable:

Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Explain the operation, troubleshooting and repair of the ignition, fuel and emission control systems of late model automobiles.
2. Use diagnostic tools and equipment to analyze and diagnose common problems.
3. Repair automotive ignition, fuel, and integrated electronic engine controls.
4. Demonstrate skills necessary to pass the ASE A8 Engine Performance Exam.

Objectives:

At the conclusion of this course, the student should be able to:

1. Evaluate and repair engine systems based on knowledge and application of engine operating principles.
2. Test, diagnose, and repair engine mechanical components.
3. Explain the operation of automotive ignition, fuel, and integrated electronic engine controls, including: On Board Diagnostics generation II (OBDII) systems, network systems, and diagnostic communication systems.
4. Analyze and diagnose common problems and repair automotive ignition, fuel, and integrated electronic engine controls, including OBDII.
5. Successfully pass a mock ASE A8 Engine Performance Certification Exam.
6. Qualify to enter the automotive trade as an apprentice level technician specializing in engine performance and emission control.

Topics and Scope:

This course conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines as of 2014

I. OBD II

- A. OBD II Connector Identification (A8-A-4)
- B. Retrieving OBD II Diagnostic Trouble Codes (A8-B-2)
- C. OBD II Monitors Status (A8-B-8 and A8-B-9)

II. Computer Fundamentals

- A. Powertrain Control Module (PCM) Actuators Diagnosis (A8-B-5)
- B. Controller Area Network (CAN) and Network Communications
- C. Module Communication (A8-B-4)

III. Temperature Sensors (A8-B-5)

IV. Oscilloscopes and Graphing Multimeters (A6-A-9)

V. Throttle Position Sensors (A8-B-5)

VI. Manifold Absolute Pressure (MAP)/Barometric Pressure (BARO) Sensors (A8-B-5)

VII. Mass Airflow Sensors (MAF) (A8-B-5)

VIII. Oxygen Sensors

- A. Oxygen Sensor Diagnosis (A8-B-5)
- B. Wide-Band Oxygen Sensor (A8-B-5)

IX. Ignition System Operation and Diagnosis

- A. Ignition System Identification (A8-A-3)
- B. Electronic Ignition Diagnosis (A8-C-1)
- C. Ignition Scope Analysis (A8-C-2)
- D. Ignition Inspection and Testing (A8-C-2)
- E. Spark Plugs Inspection (A8-C-2)
- F. Ignition Coil Testing (A8-C-2)
- G. Primary Ignition Inspection and Testing (A8-C-3 and A8-C-4)

X. Fuel Pumps, Lines, and Filters

- A. Fuel Pump Testing (A8-D-3)
- B. Fuel Pump Current Draw Test (A8-D-3)
- C. Fuel Filter Replacement (A8-D-4)

XI. Fuel Injection Components and Operation (A8-B-8, A8-D-5, A8-D-7)

XII. Electronic Throttle Control Systems (A8-A-3)

XIII. Fuel Injection System Diagnosis and Service

- A. Scan Tool Diagnosis (A8-B-1)
- B. Fuel Trim Diagnosis (A8-B-3)
- C. Port Fuel-Injection System Diagnosis (A8-D-1)
- D. Injector Resistance Testing (A8-D-6)
- E. Fuel Injector Balance Test (A8-D-6)
- F. Injector Voltage Waveform Test (A8-D-6)

XIV. Vehicle Emission Standards and Testing (A8-A-13)

XV. Emission Control Devices Operation and Diagnosis

- A. Diagnosis of Emission-Related Concerns (A8-B-3)
- B. Exhaust System Backpressure Test (A8-D-9)
- C. Positive Crankcase Ventilation (PCV) System Inspection (A8-E-1, A8-E-2)
- D. Exhaust Gas Recirculation (EGR) System Scan Tool Diagnosis (A8-E-3)
- E. Service EGR System (A8-E-4)
- F. EGR Electrical Sensors (A8-E-5)
- G. Catalytic Converter Test (A8-E-6 and A8-E-9)
- H. Secondary Air Injection Diagnosis (A8-E-7 and A8-E-8)

- I. Evaporative Emission Controls Diagnosis (A8-E-10)
- J. Smoke Test of the Evaporative Emission (EVAP) System (A8-E-11 and A8-E-12)
- XVI. Scan Tools and Engine Performance Diagnosis
 - A. OBD II Connector Identification (A8-A-4)
 - B. Scan Tool Diagnosis (A8-B-2 and A8-B4)
- XVII. Hybrid Electric Vehicle Safety Procedures
 - A. Hybrid Vehicle High Voltage (HV) Circuit Disconnect (A6-A-18)
 - B. Identify HV of Hybrid Electric Vehicles (A6-B-7)
- XVIII. Fuel Cells and Advanced Technology (A6-B-7)
- XIX. Engine mechanical
 - A. Camshaft timing
 - B. Valve adjustment
- XX. Proper tool use and safety

Assignment:

1. Weekly reading (20-70 pages)
2. Lab notebook
3. Weekly lab exercises and skill tests
4. Weekly component identification
5. Weekly lab reports
6. Weekly quizzes
7. One midterm exam
8. Final exam

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because skill demonstrations are more appropriate for this course.

Writing
0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab reports

Problem solving
5 - 20%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Lab exercises, skills test, component identification

Skill Demonstrations
30 - 50%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, midterm exam, and final exam

Exams
30 - 50%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation in lab and classroom activities and notebook

Other Category
10 - 15%

Representative Textbooks and Materials:

Automotive Engine Performance. 1st ed. Goodnight, Nicholas and VanGelder, Kirk. CDX Learning System. 2020

Instructor prepared materials