

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 181 – Engine Performance I Ignition and Fuel Systems

2 hours lecture, 2 units

Catalog Description

This lecture course includes an in-depth study of ignition and fuel system engine controls on modern automobiles and trucks, including the diagnosis and repair of these systems. On-board computer logic and strategies of ignition and fuel systems will provide the knowledge needed to describe fundamental engine performance theory and operation. This course is complimented by AUTO 181L Engine Performance I Ignition and Fuel Systems Laboratory, AUTO 181T Engine Performance I Ignition and Fuel Systems Assessment Test Out, and Work Experience courses.

Prerequisite

None

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Gasoline engine fundamentals as it relates to ignition and fuel problems
 - c. Engine operation parameter measurement and diagnosis
 - d. Ignition system operation, testing and servicing
 - e. Cooling system effects
 - f. Gasoline fuel system operation and service
 - g. Sensor PID mapping and normal values of ignition and fuel systems
 - h. Computer mapping
 - i. Input devices for ignition systems
 - j. Output devices for ignition systems
 - k. Computer-controlled gasoline fuel injection systems
 - l. Coil primary and secondary circuits
 - m. Coil driver, waste spark, coil pack, coil, driver on coil
 - n. Spark plug interpretation
 - o. Ignition wave forms
 - p. Current ramping of coils and fuel system components
 - q. Injector test procedures
 - r. Spark tester
 - s. Lab scope
 - t. Multipoint, sequential injection and spark systems
 - u. Fuel injectors
 - v. Fuel system components

Course Objectives

Students will be able to:

- 1) Identify the operation of various fuel and ignition sensors and actuators.
- 2) Use a scan tool to select PIDs and monitor normal system operation of fuel and ignition systems.
- 3) Use a lab scope to identify faults and monitor changes by waveforms of ignition and fuel systems.
- 4) Use the workshop manual, wiring diagrams, SSMS, and TSBs, to diagnose an engine performance concern.
- 5) Use the SSCC diagnostic process effectively.

- 6) Follow a pinpoint test to resolve a fuel or ignition system problem.
- 7) Identify the root cause of an electronic engine performance concern.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, and skills demonstration.

- 1) Skills-based summative assessment that measures students' ability to successfully complete the necessary tasks related to diagnosis, replacement, repair, testing of automotive engine performance systems.
- 2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing of engine performance systems.
- 3) Student portfolio of competencies record book.
- 4) Web based training modules.
- 5) Performance projects.

Special Materials Required of Student

- 1) Approved safety glasses.
- 2) High speed internet connection
- 3) Students will have access to testing tools and equipment while on campus
- 4) Safety dress code is required while in the lecture
- 5) Computer, tablet, or smart device with large screen.

Minimum Instructional Facilities

- 1) Auto tech lab (20 service bays)
- 2) Various training vehicles
- 3) Smart classroom
- 4) Diagnostic tools and equipment

Method of Instruction

- 1) Demonstration
- 2) Individual assistance
- 3) Feedback of repair processes regardless of successful or unsuccessful

Out-of-Class Assignments

- 1) **Reading:** assigned course materials, manuals, content on websites, and more.
- 2) **Writing:** assignments where students describe the required tasks related to diagnosis, replacement, repair, and testing of engine performance systems, and more.
- 3) **Other:** web-based training modules, portfolio performance projects related to engine performance systems, and more.

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically.
 - b. Required: VanGelder, Kirk. Fundamentals of Automotive Technology. Jones and Bartlett Learning, 2023.
 - c. Web Based Training Modules will be provided electronically.
 - d. Workshop Manuals will be provided electronically.
- 2) Supplemental: None

Student Learning Outcomes

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

- 1) Accurately describe various conditions of engine performance fuel and ignition systems.

- 2) Identify an engine performance fuel/ignition system problem by navigating the workshop manual based on symptoms or codes.
- 3) Communicate effectively and professionally in a diverse setting that includes prospective colleagues, clients, and supervisors.
- 4) Comply with environmental health and safety regulations at the state and federal levels.