

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 183 – Engine Performance II Intake Exhaust and Emission Systems

2 hours lecture, 2 units

Catalog Description

This lecture course provides the knowledge and skills needed to describe and identify engine performance diagnosis and testing methods of the intake, exhaust, and emission control systems. This course demonstrates diagnostic processes of normally aspirated, forced air systems, exhaust treatment, lambda sensor inputs, and various emission controls. This course is part of a three course series including AUTO 183L Engine Performance II Intake, Exhaust and Emission Systems Laboratory, AUTO 183T Engine Performance II Intake, Exhaust and Emission Systems Assessment Test Out, and Work Experience courses.

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Exhaust gas recirculation
 - c. System monitors
 - d. Evaporative fuel controls
 - e. Heated wide band oxygen sensors (HEGO)
 - f. Sensor PID mapping and normal values
 - g. Microprocessors, computers, logic systems
 - h. Input devices
 - i. Output devices
 - j. Computer-controlled systems tests
 - k. Advanced mapping
 - l. Advanced scan tool data manipulations
 - m. Catalytic Converters
 - n. Emissions systems
 - o. Lambda and exhaust gas analysis
 - p. Freeze frame data

Course Objectives

Students will be able to:

- 1) Describe standardized safety and hazardous waste handling practices.
- 2) Relate actual values to normal values of to PID data.
- 3) Describe faults using reference charts comparing expected values to measured values.
- 4) Independently perform electronic engine exhaust gas recirculation systems diagnosis.
- 5) Describe exhaust and catalyst system tests.
- 6) Interpret electronic relative compression tests.
- 7) Interpret power balance tests.
- 8) Utilize the manufacturer's electronic information system to locate application, test, and repair procedures as they apply to emission systems.
- 9) Describe various Evaporative Emission Control system testing procedures.
- 10) Describe and repair forced air injection system problems.
- 11) Describe intake manifold systems leak tests.
- 12) Describe the effect of unmeasured before and after the throttle plate.
- 13) Describe throttle body testing and repair.

- 14) Describe the cause and effect of incorrect main load sensor inputs based on sensor priority.
- 15) Describe system monitors and drive cycles.
- 16) Describe and test wide band and conventional oxygen sensors.

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 evaluate out of range PID values or sensor faults.
- 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 showing ASE tasks.
- 4) Web based training modules.
- 5) Performance projects.
- 6) Mobile technologies of live or recorded observations and assistance.

Special Materials Required of Student

- 1) Approved safety glasses.
- 2) High-speed internet connection.
- 3) Safety uniform dress code is required.
- 4) A student should have access to a tablet or computer with a full size screen, camera, and microphone.

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 (pass online pretests prior to laboratory "Test Out"), 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 the repair of various conditions of engine performance emission, exhaust, forced air, and normally aspirated systems.
- 2) Identify air fuel ratio problems 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.