

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

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

3 hours laboratory, 1 unit

Catalog Description

This laboratory course describes and demonstrates proper inspection and diagnostic techniques for various engine performance symptoms and conditions, including intake and exhaust systems operations. This course is the laboratory opportunity for students taking courses AUTO 183 Engine Performance II Intake Exhaust Emission Systems lecture, AUTO 183T Engine Performance II Intake Exhaust Emission Systems Assessment Test Out, and for students taking Work Experience for required ASE competencies.

Prerequisite

None

Course Content

- 1) Laboratory:
 - 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) Demonstrate standardized safety and hazardous waste handling practices.
- 2) Record actual values to normal values of to PID data.
- 3) Record faults using reference charts comparing expected values to measured values.
- 4) Independently perform electronic engine exhaust gas recirculation systems diagnosis.
- 5) Record exhaust and catalyst system tests.
- 6) Demonstrate electronic relative compression tests.
- 7) Demonstrate 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) Demonstrate and record various Evaporative Emission Control system testing procedures.
- 10) Demonstrate and repair forced air injection system problems.

- 11) Demonstrate 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) Demonstrate 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 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
- 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 (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 demonstrate repair of various emissions conditions of engine performance systems.
- 2) Identify and diagnose engine 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.