

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

AUTOMOTIVE TECHNOLOGY 195 – ASSET–ELECTRONIC ENGINE CONTROLS

5 hours lecture, 6 hours laboratory, 7 units

Catalog Description

Ford ASSET course to include an in-depth study of engine drivability and electronic engine controls on modern automobiles and trucks. Includes the study of basic and electronic ignition systems, early and modern fuel systems, and the repair and diagnosis of these systems. Emphasis is on electronic engine control system theory of operation and repair to include discussion of sensors, processors and actuators, and system diagnosis and repair. On-board computer logic and strategies will also be presented. Preparation for ASE Certification. Students who successfully complete this course will receive Ford Motor Company certification in Electronic Engine Control and Diesel Engine Performance Diagnosis.

Prerequisite

None

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Gasoline and diesel engine fundamentals
 - c. Engine operation parameter measurement and diagnosis
 - d. Ignition system operation, testing and servicing
 - e. Diesel and gasoline cooling system operation, testing and servicing
 - f. Gasoline fuel system operation and service
 - g. Diesel fuel system operation and service
 - h. Tune-up procedures
 - i. Oscilloscope function and operation
 - j. Introduction to solid state electronics
 - k. Voltage and resistance measurements (using DVOM and analog VOM)
 - l. Microprocessors, computers, logic systems
 - m. Input devices
 - n. Output devices
 - o. Computer-controlled carburetion systems
 - p. Computer-controlled gasoline fuel injection systems
 - q. Computer-controlled diesel fuel injection systems
- 2) Lab:
 - a. Introduction and safety
 - b. Cooling system diagnosis and repair
 - c. Fuel system diagnosis and repair
 - d. Ignition system diagnosis and repair
 - e. Tune-up procedures
 - f. Valve adjustment
 - g. Voltage drop and resistance measurements
 - h. Locating and testing various sensors on vehicles
 - i. Servicing gasoline and diesel fuel injection systems
 - j. Use of on-board diagnostics

k. Servicing computer-related malfunctions

Course Objectives

Students will be able to:

- 1) Demonstrate standardized safety and hazardous waste handling practices.
- 2) Relate theory of gasoline and diesel engine systems to practical diagnostic application.
- 3) Independently perform tune-up and repair operations using diagnostic equipment.
- 4) Independently perform electronic engine diagnostics on both gasoline and diesel vehicles.
- 5) Independently perform computer system and fuel system service using related diagnostic equipment.
- 6) Utilize the manufacturer's electronic information system to locate application, test and repair procedures as they apply to gasoline and diesel electronic engine control systems.

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, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes, written exams, and hands-on performance exam that measure students' ability to safely identify necessary action or repair, diagnose and measure engine performance related components, and perform necessary tasks related to engine performance repairs.
- 2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing, and adjustments of engine performance related systems and components.
- 3) Skills-based summative assessment that measures students' ability to successfully complete the necessary NATEF tasks related to diagnosis, replacement, repair, testing, and adjustment of engine performance systems and components.

Special Materials Required of Student

- 1) Mechanic's hand tool set
- 2) Approved safety glasses

Minimum Instructional Facilities

- 1) Auto tech lab (6 bays)
- 2) Complete tune-up and diagnostic equipment center
- 3) Various training models
- 4) Smart classroom

Method of Instruction

- 1) Lecture and demonstration
- 2) Individual assistance

Out-of-Class Assignments

- 1) Reading assignments
- 2) Writing assignments

Texts and References

- 1) Required (representative example): Various Ford Motor Company texts
- 2) Supplemental: None

Student Learning Outcomes

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

- 1) Demonstrate standardized safety and hazardous waste handling practices.

- 2) Relate theory of gasoline and diesel engine systems to practical diagnostic application using assigned lab sheets and hands-on testing.
- 3) Independently perform tune-up and repair operations using diagnostic equipment using assigned lab sheets and hands-on testing.
- 4) Independently perform electronic engine diagnostics on both gasoline and diesel vehicles using assigned lab sheets and hands-on testing.