

CUYAMACA COLLEGE
COURSE OUTLINE OF
RECORD

AUTOMOTIVE TECHNOLOGY 162 – ELECTRONICS DIAGNOSIS AND REPAIR

2 hours lecture, 2 units

Catalog Description

This lecture course includes electronic system theory, diagnosis and repair procedures utilizing state of the art equipment. This course applies basic electrical test applications incorporating electronic controls units and computer networks. Covers various vehicle computer functions such as: body electronics, infotainment systems, and electric vehicle and hybrid vehicle system operations. Students will use test equipment to measure sensor outputs used for computer component activation, and study vehicle electronic wiring diagrams in-depth, gaining knowledge, skills and abilities to perform complex tests.

Prerequisite

None

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Laboratory procedures
 - c. Equipment operation
 - d. Basic electronic principles
 - e. Automotive wiring systems
 - f. Applied electro-magnetism by electric control units
 - g. Storage capacitors
 - h. Electronic transistors
 - i. Computer memory programmable, random access memory, read only memory
 - j. Electronically controlled charging systems
 - k. Stop start vehicle operation
 - l. Electrical controls controlled by an electronic control unit (computer)
 - m. System diagnosis of electronic groups by network function
 - n. Computer inputs and outputs (sensors and actuators)
 - o. Complex wiring diagrams involving multiplexing
 - p. Variable reluctance, hall-effect, thermistors, potentiometer, pressure, and related sensor operation

Course Objectives

Students will be able to:

- 1) Identify various types of electronic components and explain their operation
- 2) Explain electronic computer operation involving sensors and modules
- 3) Define terms: inputs, outputs and modules
- 4) Identify operation of various types of sensors
- 5) Explain network communication systems
- 6) Use the workshop manual and scan tool to perform electronic tests

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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 exam.

- 1) Quizzes, written exams, and hands-on performance exams that measure students' ability to proficiently describe the required NATEF tasks related to electronics systems.
- 2) Practical exercises that measure students' progress toward communication related to diagnosis, replacement, repair, testing, of electronic circuits and components.
- 3) A student portfolio will be used to show student skills.
- 4) Web based training module.
- 5) Performance projects used to evaluate student ability to navigate repair procedures

Special Materials Required of Student

- 1) Approved safety glasses
- 2) High speed internet connection and access to a large screen computer, laptop, or tablet.
- 3) Students will have access to diagnostic and repair service tools and information.
- 4) Uniform dress code is required.

Minimum Instructional Facilities

- 1) Auto tech lab (20 bays)
- 2) Various training vehicles
- 3) Smart classroom
- 4) Distance education equipment
- 5) 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 assignments
- 2) Writing assignments
- 3) Web based training modules
- 4) Quizzes
- 5) Tests

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically.
 - b. Required: CDX Master Automotive Technician Series, 2020, ISBN: 9781284170917
 - c. Web Based Training Modules will be provided electronically.
 - d. Workshop Manuals will be provided electronically.
- 2) Supplemental: None

Exit Skills

- 1) Describe and test computer inputs
- 2) Describe and test actuator outputs
- 3) Describe normal and abnormal sensor waveforms
- 4) Demonstrate thermistors
- 5) Test potentiometers
- 6) Test variable resistors
- 7) Test various Hall Effect sensors
- 8) Pressure sensors

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- 9) Heater elements
- 10) Capture waveforms using a lab scope
- 11) Describe computer communication
- 12) Use scan tool to compare PID values to test values of sensors
- 13) Create scan tool maps
- 14) Scan tool component and systems test and activations
- 15) Describe types and functions of computer memory
- 16) Clear codes, clear adaptive memory
- 17) Describe network communication data

Student Learning Outcomes

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

- 1) Accurately diagnose electronic system problems.
- 2) Correctly repair electronic engine system problems.
- 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.