

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 263 – Advanced Electronics

1 hour lecture, 1 unit

Catalog Description

This lecture course will demonstrate and describe how to program software and perform module updates to networked systems. Examples of anti-theft and remote entry with advanced inputs and outputs may have module related concerns requiring hard fault diagnosis of modules, and networks using integrated scan tools, and tests of network signals using lab scopes for intermittent network concerns. This course is the lecture course accompanying AUTO 263L Advanced Electronics Laboratory, and AUTO 263T Advanced Electronics Assessment Test Out. Work Experience courses at an automotive workplace support competency practice and evaluations critical for student success.

Prerequisite

None

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. OBD Connector
 - c. Gateway module
 - d. Break out box or module interface connection
 - e. Pin point tests of network concerns
 - f. Network codes
 - g. Network fault symptoms
 - h. Sensor PID mapping and normal values of Anti-Theft systems
 - i. Computer mapping of PIDS
 - j. Network tests
 - k. Clearing Network codes from modules
 - l. Input devices for complex systems
 - m. Output components for complex systems
 - n. Computer-controlled multiplexing
 - o. HS CAN I, II, III, MS CAN, LIN bus, local area networks
 - p. Terminating resistors
 - q. How networks are affected by various faults
 - r. Network waveforms and fault conditions
 - s. Wiring diagram interpretation
 - t. Fault isolation techniques
 - u. Lab scope, ohm meter, and voltmeter tests and values of networks

Course Objectives

Students will be able to:

- 1) Describe network electrical failure condition based of CAN waveform patterns.
- 2) Perform network tests using a scan tool, interpret tests results, and rerun tests multiple times to isolate the module or network.
- 3) Use ohms law for diagnosis of terminating resistors.
- 4) Interpret a wiring diagram to perform tests on network circuits.

- 5) Navigate the workshop manual for code charts and symptom charts for network diagnosis and repair.
- 6) Use a lab scope on various network pins at the gateway module or DLC and display network waveforms.
- 7) Demonstrate the ability to properly program module software and diagnose software related concerns.
- 8) Diagnose hard fault and network concerns using integrated diagnostic software advanced tool functions.
- 9) Perform intermittent and network module diagnosis.

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 network systems.
- 2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing of networks and module controlled 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 lab on campus
- 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 network and module-controlled systems, and more.
- 3) **Other:** web-based training modules (pass online pretests prior to laboratory "Test Out"), portfolio performance projects related to network and module-controlled systems, and more.

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically.
 - b. CDX Advanced Electronics, 2024, **ISBN: 9781284101690**
 - 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 network systems.
- 2) Identify a network or software 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.