

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 264T – Hybrid and Electric Vehicle Operation and Diagnosis Assessment Test Out

1.5 hours laboratory, .5 unit

Catalog Description

This portfolio assessment course includes summative and criterion tests for students to prove knowledge, skills, and abilities to perform diagnosis and repair of automotive hybrid and electric vehicle systems in the department laboratory; or by using distance education technologies such as augmented reality, virtual reality, or mobile technologies. The tests include high voltage electronic component diagnosis and repair using scan tools, digital multi-meters, and lab scopes. This course allows a student residing at a distance from training centers to complete certification requirements. This course is complemented by Work Experience, AUTO 264 Hybrid and Electric Vehicle Operation and Diagnosis lecture, and AUTO 264L Hybrid and Electric Vehicle Operation and Diagnosis Laboratory courses.

Prerequisite

“C” grade or higher or “Pass” in AUTO 162T Electronics Diagnosis and Repair Assessment Test Out or the equivalent.

Entrance Skills

Without the following skills, competencies, and knowledge, students entering this course will be highly unlikely to succeed:

- 1) Demonstrate computer input and output tests and activation using a scan tool
- 2) Obtain and describe normal and abnormal waveforms using a lab-scope
- 3) Test thermistor, potentiometer, variable reluctance, pressure, Hall-effect and related sensors
- 4) Graph and interpret system data using PIDS on a scan tool
- 5) Diagnose and repair computer communication networking faults
- 6) Describe types and functions of computer memory including RAM, ROM, and PROM
- 7) Demonstrate proper diagnosis and repair of electronic system concerns

Course Content

- 1) Laboratory demonstrations:
 - a. Service disconnect, 120 Volt Convenience Cord and engine cranking/engine running diagnostic modes
 - b. Hybrid vehicle component location and function
 - c. Vehicle operating conditions scan tool recording
 - d. ECVT gear set operation
 - e. Service publication navigation
 - f. Difference between a running and cranking gasoline engine
 - g. No start diagnosis
 - h. Fuel system and evaporative emissions operation
 - i. Hybrid start-stall, high voltage battery charger and intermittent stall scan tool recording
 - j. Battery Electric Vehicle (BEV) scan tool recording
 - k. Yellow Wrench Light On diagnosis
 - l. High voltage battery charging
 - m. EV or and hybrid scan tool recording
 - n. Regenerative braking scan tool recording

Course Objectives

Students will be able to:

- 1) Demonstrate standardized safety and practices of high voltage systems.
- 2) Apply operating theory to diagnosis of engine drivability problems to hybrid systems.
- 3) Perform hybrid and EV system related repairs to prescribed manufacturers standards.
- 4) Utilize required tools and equipment to diagnose EV system problems.
- 5) Perform electrical diagnosis utilizing DVOM (Digital Volt Ohm Meter), oscilloscope and principles of electricity.
- 6) Utilize manufacturers integrated diagnostic scan tool to identify and repair specific system problems.
- 7) Identify, remove and replace battery cell according to procedures.
- 8) Follow manufacturers' procedures to disable high voltage systems.
- 9) Describe removal and replacement of inverter and EV motors.

Method of Evaluation

A grading system will be established and implemented uniformly. Grades measured by demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills, identification, and description using distance education technologies, performance projects where a student is required to submit assigned artifact examples of specific competencies.

- 1) Quizzes, written exams, and hands-on performance exam that measure students' ability to identify necessary action or repair using distance education methodologies.
- 2) Observe and document student progress while working on necessary tasks relating to diagnosis, replacement, repair, testing, and adjustment of hybrid and electric vehicle systems and components.
- 3) Manufacturer required skills-based summative assessment that measures students' ability to successfully complete the necessary ASE tasks related to diagnosis, replacement, repair, and testing of EVs, by completing required specific tasks in the student's competency record book using a digital resume.
- 4) Students must complete all of the required web based training modules.
- 5) Student portfolios required to evaluate assignments as artifacts.

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

Minimum Instructional Facilities

- 1) Various training vehicles
- 2) Smart classroom
- 3) Distance education technologies
- 4) Auto tech lab (20 bays)

Method of Instruction

- 1) Lecture and demonstration are both synchronous and asynchronous. Students are required to attend all lectures and participate with the instructor and other students during live lectures. Students will have access to recorded lectures.
- 2) Individual assistance by file sharing, computer sharing, live demonstration of project based methods for diagnosing and repairing vehicles.
- 3) Discussion boards assigned for reflections and posting of student assignments.
- 4) Classroom management system broadcast as group assignments.
- 5) Surveys of student and teacher proficiency and instruction.

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, testing, and adjustment of hybrid and electric vehicle systems and components, and more.
- 3) **Other:** web-based training modules (pass online pretests prior to laboratory "Test Out"), portfolio performance projects related to hybrid and electric vehicle systems and components, and more.

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically
 - b. Light Duty Hybrid and Electric Vehicles First Edition, 2023. ISBN:9781284198010
 - 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 and repair various conditions of hybrid and EV systems.
- 2) Demonstrate diagnosis a hybrid or EV 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.