

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 264L – Hybrid and Electric Vehicle Operation and Diagnosis Laboratory

3 hours laboratory, 1 unit

Catalog Description

This laboratory course describes and demonstrates proper inspection and diagnostic techniques for various hybrid and electric vehicle symptoms and conditions, including high voltage battery and fault symptom processes. This course is the laboratory practice opportunity for students taking courses AUTO 264 Hybrid and Electric Vehicle Operation and Diagnosis lecture, AUTO 264T Hybrid and Electric Vehicle Operation and Diagnosis Assessment Test Out, and/or for students taking a Work Experience course who need additional instruction and practice completing required ASE competencies and tasks required for certification.

Prerequisite

None

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 manufacturer integrated diagnostic scan tool to identify and repair specific system problems.
- 7) Identify, remove and replace battery cell according to procedures.
- 8) Follow manufacturer 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 exams 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) 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 repair various conditions of hybrid and EV systems.
- 2) Diagnose 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.