

CATALOG INFORMATION

Dept and Nbr: AUTO 195      Title: HYBRID VEHICLE SAFETY  
Full Title: Hybrid Electric Vehicle Safety Training for First Responders  
Last Reviewed: 9/20/2010

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	0.50	Lecture Scheduled	0.50	17.5	Lecture Scheduled	8.75
Minimum	0.50	Lab Scheduled	0.33	6	Lab Scheduled	5.78
		Contact DHR	0		Contact DHR	0
		Contact Total	0.83		Contact Total	14.53
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 17.50

Total Student Learning Hours: 32.03

Title 5 Category: AA Degree Applicable  
Grading: Grade or P/NP  
Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP  
Also Listed As: DET 195  
Formerly:

**Catalog Description:**  
Broad overview of HEV (Hybrid Electric Vehicle) terminology, operational principles, component layout, critical importance of safety and hybrid-unique equipment and procedures. This class is intended for First Responders (i.e. Police, Paramedic, Fire Department, and other similar personnel), although it may be taken by any interested persons.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Broad overview of HEV (Hybrid Electric Vehicle) terminology, operational principles, component layout, critical importance of safety and hybrid-unique equipment and procedures. This class is intended for First Responders (i.e. Police, Paramedic, Fire Department, and other similar personnel), although it may be taken by any interested persons. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU GE:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>IGETC:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>
<b>UC Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon completion of the course, students will be able to:

1. Identify the various hybrid system components.
2. Demonstrate safety procedures and describe their critical importance.
3. Describe and demonstrate knowledge of high voltage system shut down procedures.
4. Use test equipment and service information appropriately to ensure safe vehicle access.

### **Topics and Scope:**

- A. Introductory principles
  1. Hybrid and electric vehicle vocabulary
  2. Hybrid and electric vehicles in production
  3. Types of hybrid systems
    - a. Series
    - b. Parallel
    - c. Series/parallel
    - d. Mild and assist hybrids
    - e. Plug-in hybrids
- B. Electrical theory basics and safety implications
- C. Battery basics
  1. Lead-Acid (Pb-A)
  2. AGM (Absorbed Gas Mat) Battery (12 volt system)
  3. High-Voltage (HV) System Batteries
    - a. NiMH (Nickel Metal Hydride)
    - b. Lithium-Ion (Li-Ion) and other new battery technologies
    - c. Importance of HV state-of-charge
- D. Safety

1. Personal safety
2. Electrical safety gloves
3. Tools and equipment
  - a. Mega-ohm meter
  - b. Scanners (e.g., Toyota Technical Information System (TIS))
  - c. Using appropriate fluids
- E. Safety procedures (shop)
  1. Depowering HV system
  2. Importance of ensuring auto in shutdown mode
  3. Repowering HV System
  4. Safety procedures (test driving)
- F. Identifying HEVs
  1. Honda and/or GM (Mild Hybrid) Systems
  2. Toyota and/or Nissan and/or Ford (Full Hybrid) Systems
  3. Others
- G. Locating primary electrical and mechanical components on HEVs

### Assignment:

1. Conduct component location on a college vehicle (or vehicles)
2. Group project identifying safety shutdown procedure for HEV
3. Summarize findings of group project results and present to class
4. Evaluations of on-line resources
5. Textbook and hand-out reading assignments (approximately 10-25 pages per week)
6. Pretest and final exam

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Group project; evaluation of online safety information resources

Problem solving  
10 - 20%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Demonstration of HEV safety and shutdown procedures

Skill Demonstrations  
20 - 30%

**Exams:** All forms of formal testing, other than skill performance exams.

Pretest and final exam
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Exams 40 - 50%
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**Other:** Includes any assessment tools that do not logically fit into the above categories.

Oral summary of findings
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Other Category 5 - 10%
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**Representative Textbooks and Materials:**

Halderman, James & Tony Martin. Hybrid and Alternative Fuel Vehicles. Prentice Hall, 2011.  
Erjavec, Jack & Jeff Arias. Hybrid, Electric & Fuel Cell Vehicles. Delmar Cengage Learning, 2006.

Rosebro, Jack. Basic Hybrid Powertrains. Perfect Sky, 2008.

Instructor prepared materials.