BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

AUT 60 - Hybrid and Alternative Fuel Technologies **4 Unit(s)**

Prerequisite(s): NONE
Recommended Prep: AUT 41

Transfer Status: CSU
34 hours Lecture
102 hours Lab

This course covers the theory of operation and service of alternative fuel and hybrid powered cars and light trucks. Topics include fuel tank and battery inspection service, regenerative braking systems, motor/generator and transmission, and fuel cell technologies. Emphasis is placed on safety precautions necessary when servicing hybrid and alternative fueled vehicles. Students will be working on and around the high voltage electrical system on hybrid vehicles. Due to the potential for electrical shock, students must demonstrate an understanding of electrical theory and safety by successfully passing the AUT 60 entrance exam with a score of 70% or more on the first day of class. Students who do not pass the AUT 60 entrance exam will be disenrolled from the course.

II. **OBJECTIVES**

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

A. Identify and practice the specific safety precautions to take when servicing hybrid and alternative fueled vehicles.
B. Identify the different types of fuels used in alternative fuel and clean diesel vehicles.
C. Distinguish between series, parallel, and pure electric vehicles.
D. Describe principles of electricity and electromagnetism and explain their application in hybrid vehicles.
E. Identify components and perform diagnostic procedures on the electric motor/generator systems used in hybrid vehicles.
F. Identify the components and diagnostic procedures used on the battery system and service related components in hybrid vehicles.
G. Identify the components and diagnostic procedures used on regenerative braking systems.
H. Evaluate Diagnostic Trouble Codes (DTCs) related to hybrid and alternative fuel systems and to repair system failures.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Introduction to hybrid and alternative fuel vehicles.	2.00
2. Introduction to clean diesel and bio-diesel vehicles.	2.00
3. Hybrid and alternative fuel vehicle safety precautions and tools.	4.00
4. Alternative fuel tank inspecion and service procedures.	4.00
5. Hybrid battery inspection and battery service precautions.	4.00
6. Hybrid motor/generator inspection and service precautions.	4.00
7. Hybrid regenerative braking system service and safety precautions.	2.00
8. Hybrid transmission service and safety precautions.	2.00
9. Hybrid climate control service and safety precautions.	2.00

10. Fuel cell vehicles and advanced technologies.	2.00
11. Hybrid and alternative fuel vehicle system DTCs.	2.00
12. Diagnosing and repairing hybrid and alternative fuel vehicles using scan tools and system specific tools and testers.	4.00
Total Hours	34.00

Lab

Topics	Hours
1. Identifying hybrid, alternative fuel, and diesel fueled vehicle systems.	12.00
2. Hybrid and alternative fuel safety precautions and tool use.	12.00
3. Alternative fuel tank identification, inspection and certification procedures.	12.00
4. Hybrid battery service.	12.00
5. Hybrid motor/generator service.	12.00
6. Hybrid braking system service.	6.00
7. Hybrid transmission service.	6.00
8. Hybrid heating and air conditioning service.	6.00
9. Scan tool and system specific tool use and operation.	6.00
10. Diagnosis and repair of hybrid, alternative fuel and diesel fueled vehicle systems.	18.00
Total Hours	102.00

IV. METHODS OF INSTRUCTION

A. Lecture
B. Instructor Demonstrations
C. Collaborative Group Work
D. Class Activities
E. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
F. Reading Assignments
G. Multimedia Presentations

V. METHODS OF EVALUATION

A. Quizzes
B. Demonstration
C. Lab Projects
D. Written Assignments
E. Performance Examinations
F. Written or Oral Examinations
G. Mid-term and final examinations

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
    1. Using All Data, Mitchell, or Honda IN, interpret the service procedures for the assigned vehicle system and be ready to discuss in class.
    2. Read the chapter about hybrid battery safety and servicing, then complete the questions in the end of chapter review, and be prepared to discuss in class.
B. Writing Assignments

1. Complete the work sheets in the supplied lab work book titled "Battery Safety and Servicing," and submit to the instructor for grading.
2. Complete a repair order following B.A.R. requirements. When you have completed the prescribed service, write a story on the back of the R.O. and make sure it contains the "3 C's".

C. Out-of-Class Assignments

1. Complete "Mechanical Safety" training using the S/P2 online safety website, print out certificate of completion and submit to the instructor.
2. Log into Honda's Online University and complete the cognitive modules in section titled "Hybrid Systems." Print out proof of completion at end of module for submission, and be prepared to discuss the module lesson in class.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Halderman, James D. & Martin, Tony. Hybrid and Alternative Fuel Vehicles. 4th Edition. Pearson, 2016.

Created/Revised by: Craig Kielb
Date: 11/02/2015