

BUTTE COLLEGE

COURSE OUTLINE

I. CATALOG DESCRIPTION

AUT 42 - Advanced Specialized Automotive Electronics and Microcomputers 5.5 Unit(s)

Prerequisite(s): AUT 41

Recommended Prep: AUT 1

Transfer Status: CSU

68 hours Lecture

76.5 hours Lab

This course is a continuation of AUT 41 and in this course the student will build upon fundamentals of electricity gained in AUT 41 to develop logical, strategy-based diagnostic routines. These routines will be used to diagnose electrical faults found in Hybrid, PZEV (Partial Zero Emissions Vehicle), gasoline, diesel and alternative fuel vehicles. The manufacturer-specific scan tools will be emphasized along with the advanced diagnostic routines needed to correct circuit anomalies such as shorts, opens, and parasitic draws. Multiplex systems will be discussed including their analog and digital inputs and outputs. This course will provide the student with the knowledge and understanding of manufacture specific electrical systems found in modern vehicles.

II. OBJECTIVES

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

- A. Navigate and operate manufacturer-specific scan tools.
- B. Use manufacturer-specific scan tools to monitor, record, play back and up-load vehicle data stream information.
- C. Identify and describe the differences between brush and brush-less motors (hybrid).
- D. Identify, diagnose and service OBD II (On Board Diagnostic) electrical connectors.
- E. Identify, explain and test multiplex control module inputs.
- F. Identify, explain and test multiplex control module outputs.
- G. Use manufacturer-specific tools to diagnose parasitic draws.
- H. Develop a strategy based diagnostic routine to diagnose and repair various circuit faults.

III. COURSE CONTENT

A. Unit Titles/Suggested Time Schedule

Lecture	
<u>Topics</u>	<u>Hours</u>
1. Manufacturer-specific scan tool operation and navigation	3.50
2. Manufacturer-specific use of semiconductors in control modules	17.00
3. Electric motor types theory and operation	3.50
4. OBD II electrical terminal diagnosis and repair	3.50
5. ECU (Engine Control Unit) multiplex communication networks testing and troubleshooting	7.00
6. ECU multiplex module inputs and outputs testing and troubleshooting	7.00
7. Parasitic draw testing and troubleshooting	3.50
8. Strategy based troubleshooting	16.00
9. Troubleshooting specific circuit faults	7.00
Total Hours	68.00

Lab

<u>Topics</u>	<u>Hours</u>
1. Scan tool navigation and operation	4.00
2. Scan tool data stream capture and DTC (Diagnostic Trouble Code) diagnostics	16.00
3. Testing electrical motors	4.00
4. Servicing OBD II multi-pin connectors	8.00
5. Multiplex network circuit analysis	4.00
6. Digital and analog input testing	16.00
7. Digital output testing	4.00
8. Parasitic draw testing using manufacture specific tools	4.00
9. Troubleshooting by dividing a circuit	4.00
10. Troubleshooting short circuits and relays	4.50
11. Strategy based troubleshooting application	8.00
Total Hours	76.50

IV. **METHODS OF INSTRUCTION**

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

V. **METHODS OF EVALUATION**

- A. Exams/Tests
- B. Class participation
- C. Written or Oral Examinations
- D. Practical Evaluations
- E. Group Participation
- F. One hands-on individual lab final

VI. **EXAMPLES OF ASSIGNMENTS**

- A. Reading Assignments
 - 1. Read the module “MVCI (Modular Vehicle communication Interface) DTC Diagnostics”. Be prepared to demonstrate the use of the scan tool in in lab.
 - 2. Read the module regarding “Testing control module inputs” and take the corresponding test.
- B. Writing Assignments
 - 1. Compose a 100+ word journal entry describing in detail the function of a thermistor in an engine.
 - 2. Compose a 100+ word journal entry regarding the proper way to solder an OBD II electrical terminal.
- C. Out-of-Class Assignments
 - 1. Communicate with your lab partner and develop a strategy to diagnose the instructor provided electrical fault. Your dialogue must reflect industry best practices and professional language.

2. Research both manufacture and industry specific web sites for TSB's (Technical Service Bulletin) related to the instructor provided electrical fault. Be prepared to apply what you learned to a bugged car.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Materials Other Than Textbooks:

- A. Web-based Learning Modules delivered via On-line University/American Honda
- B. Electrical test boards, parts and accessories and complete systems or units of the automobile are used at the appropriate time to convey related information, shop work and reference.

Created/Revised by: Robert Holt

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