AUTO 156 Course Outline as of Fall 2015

CATALOG INFORMATION

Dept and Nbr: AUTO 156 Title: AUTO ELECTRIC SYSTEM
Full Title: Automotive Electrical System
Last Reviewed: 1/24/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	5.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	7.00		Contact Total	122.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00 Total Student Learning Hours: 262.50

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

Catalog Description:
The operation, diagnosis and repair of automotive electrical and electronic systems. Techniques of troubleshooting, service, and repair of starting, charging, and other chassis and body electrical systems. Introduction to computer controlled systems. Prepare students to take the ASE (Automotive Service Excellence) A6 Electrical/Electronics Certification. This course conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: The operation, diagnosis and repair of automotive electrical and electronic systems. Techniques of troubleshooting, service, and repair of starting, charging, and other chassis and body electrical systems. Introduction to computer controlled systems. Prepare students to take the ASE (Automotive Service Excellence) A6 Electrical/Electronics Certification. This course

conforms with National Automotive Technicians Education Foundation (NATEF) instructional guidelines. (Grade Only)
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:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Perform routine testing of electrical and electronic systems.
2. Perform computer network diagnosis.
3. Utilize various types of electrical diagnostic test equipment.
4. Demonstrate skills necessary to pass the ASE (Automotive Service Excellence) A6 Auto Eelectrical/Electronics Certification.

Objectives:
Upon completion of this course, students will be able to:
1. Explain theories of automotive electrical and electronic systems design and operation.
2. Differentiate among types of electrical circuits.
3. Troubleshoot electrical circuits.
4. Diagnose electrical system problems using electrical system schematics.
5. Test, evaluate and repair common electrical systems.
6. Explain the requirements and processes for obtaining ASE (Automotive Service Excellence) A6 Auto Electrical/Electronic Certification and B.A.R. (Bureau of Automotive Repair) Lamp Adjuster Certification.
7. Diagnose and repair computer control networks and related components.
8. Use computer information systems, manufacturers shop manuals, and the World Wide Web to access necessary repair information.

Topics and Scope:

This course conforms with National Automotive Technicians Education Foundation (NATEF)

instructional guidelines as of 2014 and also includes general safety and operational principles.

1. Service Information, Tools, and Safety
   a. Fire Extinguisher*
   b. Vehicle Hoisting*
   c. Safety Check*
   d. Work Order (A6-A-1)
   e. Vehicle Service Information (A6-A-3)
   f. Vehicle Service History (A6-A-3)
   g. Technical Service Bulletins (A6-A-3)
   h. Vehicle Identification Number (VIN) Code (A6-A-4)
   i. Vehicle Safety Certification Label (A6-A-4)
   j. High-Voltage Circuits Identification (A6-B-7)
   k. Hybrid High-Voltage Disconnect (A6-A-18)
   l. Temporary Disabling of an Airbag (A6-H-6)
2. Environmental and Hazardous Materials
   a. Proper Handling and Disposal
   b. Material Safety Data Sheet (MSDS)*
3. Electrical Fundamentals*
4. Electrical Circuits and Ohm's Law*
5. Series, Parallel, and Series-Parallel Circuits
   a. Series Circuit Worksheet #1 (A6-A-5)
   b. Series Circuit Worksheet #2 (A6-A-5)
   c. Series Circuit Worksheet #3 (A6-A-5)
   d. Parallel Circuit Worksheet #1 (A6-A-5)
   e. Parallel Circuit Worksheet #2 (A6-A-5)
   f. Parallel Circuit Worksheet #3 (A6-A-5)
   g. Series-Parallel Circuit Worksheet #1 (A6-A-5)
   h. Series-Parallel Circuit Worksheet #2 (A6-A-5)
   i. Series-Parallel Circuit Worksheet #3 (A6-A-5)
6. Circuit Testers and Digital Meters
   a. Digital Multimeter Use for Electrical Problems (A6-A-7)
   b. Test Light Usage (A6-A-8)
   c. Circuit Testing Using a Fused Jumper Wire (A6-A-10)
7. Oscilloscopes and Graphing Multimeters (A6-A-9)
8. Automotive Wiring and Wire Repair
   a. Fusible Links, Circuit Breakers, and Fuses (A6-A-13)
   b. Inspect and Test the Switches (A6-A-14)
   c. Inspect Wiring and Connectors (A6-A-15)
   d. Wire harness and Connector Repair (A6-A-16)
   e. Solder Wire Repair (A6-A-17)
9. Wiring Schematics and Circuit Testing
   a. Identify/Interpret Electrical Systems Concerns (A6-A-2)
   b. Diagnose Electrical/Electronic Circuits (A6-A-5 and A6-A-6)
   c. Locate Shorts, Grounds, and Opens (A6-A-11)
10. Capacitance and Capacitors
   a. Blower Motor Radio Noise (A6-H-7)
   b. Capacitor Functions
11. Magnetism and Electromagnetism
   a. Principles of magnetism
   b. Inspect and Test the Relays (A6-A-14)
12. Electronic Fundamentals*

13. Computer Fundamentals
    a. Computer Functions
    b. PCM (Powertrain Control Module) Actuators Diagnosis (A8-B-5)
14. CAN (Controller Area Network)
    a. Network Communications
    b. Module Communication (A8-B-4)
15. Batteries Specifications*
16. Battery Testing and Service
    a. Key Off Battery Drain (A6-A-12)
    b. Battery and Capacity Tests (A6-B-1 and A6-B-2)
    c. Electronic Memory Saver Usage (A6-B-3)
    d. Service and Replace the Battery (A6-B-4)
    e. Battery Charging (A6-B-5)
    f. Jump Starting (A6-B-6)
    g. Reinitialization (A6-B-8)
    h. Hybrid Auxiliary Battery (A6-B-9)
17. Cranking System Identification*
18. Cranking System Diagnosis and Service
    a. Starter Disassembly and Testing*
    b. Starter Solenoid Testing*
    c. Starter Voltage Drop/Current Draw Tests (A6-C-1, A6-C-2, and A6-C-6)
    d. Starter Relays and Solenoids (A6-C-3, A6-C-5)
    e. Remove and Install the Starter (A6-C-4)
19. Charging System
    a. Alternator Identification*
    b. Charging System Diagnosis and Service
    c. Alternator Disassembly*
    d. Alternator Rotor Testing*
    e. Alternator Stator Testing*
    f. Alternator Rectifier Bridge Testing*
    g. Charging System Output Test (A6-D-1)
    h. Charging System Diagnosis (A6-D-2)
    i. Remove and Install Alternator (A6-D-3 and A6-D-4)
    j. Charging Circuit Voltage Drop (A6-D-5)
    k. Lighting and Signaling Circuits
    l. Lighting System Diagnosis (A6-E-1, A6-E-2, and A6-E-3)
    m. High-Intensity Discharge Headlights (A6-E-4)
20. Driver Information and Navigation Systems
    a. Gauge Diagnosis (A6-F-1)
    b. Driver Information and Warning Devices (A6-F-2, A6-F-3, and A6-F-4)
21. Horn, Wiper, and Blower Motor Circuits
    a. Horn (A6-G-1)
    b. Windshield Wiper/Washer (A6-G-2 and A6-G-3)
    c. Blower Motor Circuit (A6-H-1)
22. Accessory Circuits
    a. Power Accessory Diagnosis (A6-H-1, A6-H-2, A6-H-3, and A6-H-4)
    b. Door Panel (A6-H-8)
    c. Body and Module Communication Diagnosis (A6-H-9 and A6-H-10)
    d. Keyless Entry and Anti-Theft Diagnosis (A6-H-11, A6-H-12, and A6-H-13)
23. Airbag and Pretensioner Circuits
    a. Airbag Diagnosis (A6-H-5)
    b. Disarm and Enable Airbags (A6-H-6)

24. Audio System Operation and Diagnosis (A6-H-7)
*Topics not specified by NATEF as of Fall 2014

Assignment:

1. Students will keep a notebook of all class assignments and class notes that may be graded for completeness and organization.
2. Lab exercises and skill tests
3. Component identification
4. Lab reports: Complete work orders, diagnostic sheets, parts orders, time sheets correctly, neatly and legibly.
5. Reading: 50 pages per week
6. 2-6 quizzes, midterm exam 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 and skill demonstrations 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.

Lab reports	Problem solving 5 - 20%

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

Skill tests, lab exercises. component identification	Skill Demonstrations 30 - 50%

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

2-6 quizzes, midterm exam and final exam	Exams 30 - 50%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation in lab and classroom activities, notebook	Other Category 10 - 15%

Representative Textbooks and Materials:
Diagnosis and Troubleshooting of Automotive Electrical, Electronic, and Computer Systems, James D. Halderman, Prentice Hall, 6th Ed 2012.