AUTO 011B: AUTO ELECTRONICS & ELECTRICAL SYSTEMS

Originator
jmagbuhat

Justification / Rationale
Remove material (uniform) fees.

Effective Term
Fall 2019

Credit Status
Credit - Degree Applicable

Subject
AUTO - Automotive Technology

Course Number
011B

Full Course Title
Auto Electronics & Electrical Systems

Short Title
AUTO ELEC

Discipline

Disciplines List
Automotive Technology

Modality
Face-to-Face

Catalog Description
This course provides theory and hands-on experience in the fundamentals of automotive electricity including basic electrical principles, circuit components, circuit types, electrical system service and maintenance, diagnosis and repair of common circuit malfunctions. The focus is then placed on foundational automotive electrical components and systems including: batteries, starting systems and charging systems with an emphasis on troubleshooting, diagnosis and repair of common electrical system malfunctions. A $20.00 test fee for the appropriate Automotive Service Excellent (ASE) Student Exam is required. A uniform is required for this course.

Schedule Description
This class provides lecture/discussion and hands-on experience understanding, servicing, troubleshooting, diagnosing and repairing fundamental automotive electrical circuit and system malfunctions. A $20.00 test fee for the appropriate Automotive Service Excellent (ASE) Student Exam is required. A uniform is required for this course.
Prerequisite: AUTO 010 or concurrent enrollment
Advisory: RDG 061, ENG 061

Lecture Units
3

Lecture Semester Hours
54

Lab Units
1

Lab Semester Hours
54

In-class Hours
108

Out-of-class Hours
108

Total Course Units
4

Total Semester Hours
216

Prerequisite Course(s)
AUTO 010 or concurrent enrollment
Advisory: RDG 061, ENG 061

Required Text and Other Instructional Materials

Resource Type
Book

Author
Chris Johanson

Title
Modern Automotive Technology NATEF Standards Job Sheets for Performance-Based Learning

Edition
9th

Publisher
G-W

Year
2017

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
9781631263781

Resource Type
Book

Author
Duffy, J.

Title
Automotive Electricity Electronics

Edition
6th

City
Tinley Park

Publisher
Goodheart-Wilcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
11.7

ISBN #
9781619607477

Resource Type
Book

Author
Duffy, J.

Title
Auto Electricity and Electronics (Work book)

Edition
6th

City
Tinley Park

Publisher
Goodheart-Wilcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
11.7

ISBN #
9781619607514

Class Size Maximum
24

Entrance Skills
Perform starter current draw tests; determine necessary action. Perform starter circuit voltage drop tests; determine necessary action. Inspect and test starter relays and solenoids; determine necessary action. Remove and install a starter in a vehicle.

Prerequisite Course Objectives
AUTO 010-Describe shop safety practices and proper procedures regarding handling hazardous material.
AUTO 010-Properly position and lift a vehicle using a floor jack and jack stands and a vehicle hoist.

Entrance Skills
Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.

Prerequisite Course Objectives
AUTO 010-Describe shop safety practices and proper procedures regarding handling hazardous material.

AUTO 010-Locate applicable vehicle service specifications and procedures using the latest online service information.
AUTO 010-Test drive a vehicle to verify the concern and the repair.

Entrance Skills

Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). Use wiring diagrams during diagnosis of electrical circuit problems. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.

Prerequisite Course Objectives

AUTO 010-Describe shop safety practices and proper procedures regarding handling hazardous material.
AUTO 010-Locate applicable vehicle service specifications and procedures using the latest online service information.
AUTO 010-Properly connect a digital multimeter and read volts, amps and ohms on a basic electrical circuit.

Entrance Skills

Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

Prerequisite Course Objectives

AUTO 010-Identify and describe the purpose of the following components and systems: engine, transmission, suspension, braking system, fuel system, ignition system, electrical system and steering system.
AUTO 010-Perform a detailed vehicle inspection.
AUTO 010-Properly connect a digital multimeter and read volts, amps and ohms on a basic electrical circuit.

Entrance Skills

Use various reading strategies to prepare, read and comprehend expository text

Prerequisite Course Objectives

RDG 061-Use SQ3R /or SOAR along with outlining, note-taking, mapping summarizing and other strategies to prepare, read, comprehend expository text.

Entrance Skills

Read a variety of texts fluently.

Prerequisite Course Objectives

RDG 061-Read a variety of texts fluently.

Entrance Skills

Write organized summaries reactions that capture main idea and supporting details.

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.
RDG 061-Write organized summaries reactions that capture main idea and supporting details.

Entrance Skills

Understand multiple word meanings, uses synonyms

Prerequisite Course Objectives

ENG 061-Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.
RDG 061-Understand multiple word meanings, uses synonyms

Course Content

1. Overview of automotive electrical systems
2. Basic electrical theory
3. Electrical components

4. Wiring and circuit diagrams
5. Batteries
6. Starting systems
7. Charging systems
8. Electrical accessories
9. Chrysler web-based training modules

Lab Content

1. Required tasks to meet NATEF 2017 standards.
2. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret electrical/electronic system concern; determine necessary action.
4. Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.
5. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
6. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).
7. Use wiring diagrams during diagnosis of electrical circuit problems.
8. Demonstrate the proper use of a digital multi-meter (DMM) during diagnosis of electrical circuit problems.
9. Check electrical circuits with a test light; determine necessary action.
10. Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.
11. Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
12. Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.
13. Check electrical circuits using fused jumper wires; determine necessary action.
14. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
15. Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
16. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
17. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.
18. Perform battery state-of-charge test; determine necessary action.
19. Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.
20. Maintain or restore electronic memory functions.
21. Inspect, clean, fill, and replace battery.
22. Perform slow/fast battery charge.
23. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
24. Start a vehicle using jumper cables and a battery or auxiliary power supply.
25. Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.
26. Perform starter current draw tests; determine necessary action.
27. Perform starter circuit voltage drop tests; determine necessary action.
28. Inspect and test starter relays and solenoids; determine necessary action.
29. Remove and install starter in a vehicle.
30. Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.
31. Perform charging system output test; determine necessary action.
32. Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
33. Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.
34. Remove, inspect, and install generator (alternator).
35. Perform charging circuit voltage drop tests; determine necessary action.

Course Objectives

	Objectives
Objective 1	Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
Objective 2	Identify and interpret electrical/electronic system concern; determine necessary action.

Objective 3	Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.
Objective 4	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
Objective 5	Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).
Objective 6	Use wiring diagrams during diagnosis of electrical circuit problems.
Objective 7	Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.
Objective 8	Check electrical circuits with a test light; determine necessary action.
Objective 9	Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.
Objective 10	Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.
Objective 11	Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.
Objective 12	Check electrical circuits using fused jumper wires; determine necessary action.
Objective 13	Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.
Objective 14	Measure and diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
Objective 15	Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
Objective 16	Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.
Objective 17	Perform battery state-of-charge test; determine necessary action.
Objective 18	Perform battery capacity test (or conductance test); confirm proper battery capacity for vehicle application; determine necessary action.
Objective 19	Maintain or restore electronic memory functions.
Objective 20	Inspect, clean, fill, and replace battery.
Objective 21	Perform slow/fast battery charge.
Objective 22	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
Objective 23	Start a vehicle using jumper cables and a battery or auxiliary power supply.
Objective 24	Identify hybrid vehicle auxiliary (12v) battery service, repair and test procedures.
Objective 25	Perform starter current draw tests; determine necessary action.
Objective 26	Perform starter circuit voltage drop tests; determine necessary action.
Objective 27	Inspect and test starter relays and solenoids; determine necessary action.
Objective 28	Remove and install starter in a vehicle.
Objective 29	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.
Objective 30	Perform charging system output test; determine necessary action.
Objective 31	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
Objective 32	Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.
Objective 33	Remove, inspect, and install generator (alternator).
Objective 34	Perform charging circuit voltage drop tests; determine necessary action.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Illustrate basic level repairs to vehicle electrical system malfunctions using wiring diagrams, service information, and digital multi-meter.
Outcome 2	Demonstrate troubleshooting capabilities on vehicle electrical system malfunctions using wiring diagrams, service information, and a digital multi meter.
Outcome 3	Diagnose basic level vehicle electrical system malfunctions using wiring diagrams, service information, and a digital multimeter.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Collaborative/Team	Students will work in team setting
Technology-based instruction	Diagnostic test equipment and digital based tools
Participation	Student will participate in classroom activities, research activities, role-play, interactive testing
Lecture	Each class is half lecture covering multiple aspects of course content
Laboratory	Student will participate in lab based activities to complete their NATEF standards job sheets
Discussion	Students will participate in critical diagnostic discussion making and critical thinking
Demonstration, Repetition/Practice	Each student will demonstrate their ability to correctly perform a given task

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
College level or pre-collegiate essays	A research report submitted or completed, not limited to, a written presentation, however, the student is required to research information pertaining to the assignment.	Out of Class Only
Self-paced testing,Student preparation	Readings from required text: 1-3 chapters per week from both classroom and shop manuals. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.	Out of Class Only
Mid-term and final evaluations	Used to evaluate students' knowledge and understanding of the information presented. Examples of these are not limited to quizzes, exams, presentations, research, or projects.	In and Out of Class
Self-paced testing,Student preparation	Readings from required text: 1-3 chapters per week from both classroom and shop manuals. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.	Out of Class Only
Computational/problem-solving evaluations	Analysis based assignments pertaining to course information diagnostic procedures used to enhance students problem solving skills.	Out of Class Only
Laboratory projects	Student will participate in lab based activities to complete their NATEF standards job sheets	In Class Only
Reading reports	Turned in by report, written, presentation, however the student is required to research information pertaining to the assignment	Out of Class Only
Written homework	Readings from required text: 1-3 chapters per week from both classroom and shop manuals. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week	Out of Class Only

Assignments

Other In-class Assignments

1. Lecture notes
2. Classroom discussion/participation with problem solving scenarios
3. Hands on activities on electrical circuit boards

4. Wiring diagram analysis
5. Quizzes

Other Out-of-class Assignments

1. Readings from required text: 1-3 chapters per week from both classroom and shop manuals. Each chapter 2 hours per week.
2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week. Each chapter 2 hours per week.
3. Completion of 2 SP2 safety tests, each subject including an average of 4 hours
   a. Mechanical Safety
   b. Pollution prevention
4. Assigned readings and written summaries from selected instructor handouts. 1 hour.
5. Written summaries and analysis of assigned websites.
6. Must complete a course project consisting an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork. 8 hours
7. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities. The notebook must be organized by chapter, in-class notes, handouts and extra-credit assignments. The notebook will be evaluated after the half way point and graded at the end of the course.
8. Vehicle diagnosis, troubleshooting and repair of personal, shop, and other vehicles to be evaluated by the instructor during lab time.
9. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.
10. Must develop teamwork skills through lab activities and assigned special projects.
11. Chrysler web-based training modules, each taking roughly 3 hours
12. Exam prep. 12 hours

Grade Methods

Letter Grade Only

MIS Course Data

CIP Code

47.0604 - Automobile/Automotive Mechanics Technology/Technician.

TOP Code

094800 - Automotive Technology

SAM Code

C - Clearly Occupational

Basic Skills Status

Not Basic Skills

Prior College Level

Not applicable

Cooperative Work Experience

Not a Coop Course

Course Classification Status

Credit Course

Approved Special Class

Not special class

Noncredit Category

Not Applicable, Credit Course

Funding Agency Category

Not Applicable

Program Status
Program Applicable

Transfer Status
Transferable to CSU only

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
Yes

Additional Fee Amount
$20.00

Additional Fees Description
Automotive Service Excellent (ASE) Student Exam

Approvals

Curriculum Committee Approval Date
02/21/2019

Academic Senate Approval Date
02/28/2019

Board of Trustees Approval Date
03/15/2019

Course Control Number
CCC000455017

Programs referencing this course
Automotive Air Conditioning Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=104/)
Automotive Electrical Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=105/)
Automotive Emissions Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=106/)
Automotive Engine Management Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=107/)
Automotive Transmission Axle Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=108/)
Brakes Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=109/)
General Automotive Service Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=110/)
Light and Medium Duty Diesel Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=111/)
Steering, Suspension, Alignment Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=112/)
Hybrid, Fuel Cell, Electric Vehicle Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=198/)
Automotive Introductions Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=201/)
Engineering Technology AS Degree (http://catalog.collegeofthedesert.eduundefined?key=209/)
Advanced Transportation Technologies AS Degree (http://catalog.collegeofthedesert.eduundefined?key=44/)
Advanced Transportation Technologies AS Degree (http://catalog.collegeofthedesert.eduundefined?key=45/)
Automotive Technology AS Degree (http://catalog.collegeofthedesert.eduundefined?key=57/)
Automotive Alternative Fuels Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=82/)