AUTO 011C: ADVANCED AUTOMOTIVE ELECTRICAL SYSTEMS

Originator

dredman

Co-Contributor(s)

Name(s)
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Justification / Rationale

The Automotive Faculty are reviewing and/or updating this course to assure compliance with local, State, and Federal regulations; support consistency within the curriculum; practice relevance in regard to automotive industry and community; and to make improvements that will strengthen the learning environment this course creates thus benefiting the learners.

Effective Term

Fall 2022

Credit Status

Credit - Degree Applicable

Subject

AUTO - Automotive Technology

Course Number

011C

Full Course Title

Advanced Automotive Electrical Systems

Short Title

ADV AUTO ELEC

Discipline

Disciplines List
Automotive Technology

Modality

Face-to-Face
Hybrid

Catalog Description

This course provides theory and hands-on experience in intermediate to advanced automotive body electricity circuits and systems including body control computers, bus communication, multiplexing, instrument panel circuits, an introduction to advanced driver assist systems (ADAS) and an introduction to passive restraint systems. There is a hands-on emphasis focusing on diagnosing, trouble-shooting and repairing intermediate to advanced body electrical system malfunctions. A uniform is required for this course.

Schedule Description

This class provides lecture/discussion and hands-on experience understanding, servicing, troubleshooting, diagnosing and repairing intermediate to advanced automotive body electrical systems and common malfunctions. Prerequisite: AUTO 011B

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 011B

Required Text and Other Instructional Materials

Resource Type
Book

Open Educational Resource
No

Author
Various

Title
ASE Automotive Suite (Text, shop manual, and workbook for all 8 ASE automotive categories)

Edition
7th

City
Tinley Park, Illinois

Publisher
Goodheart Wilcox

Year
2021

College Level
Yes

Flesch-Kincaid Level
11.4

ISBN #
978-1-64564-559-7

Resource Type
Book

Author
M. Ellison

Title
Automobiles Have Computers?

Edition
1

City
Dubuque, IA

Publisher
Kendall Hunt

Year
2022

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
978-1-7924-9479-6

Class Size Maximum
21

Entrance Skills
Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Requisite Course Objectives
AUTO 011B-Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Entrance Skills
Identify and interpret electrical/electronic system concern; determine necessary action.

Requisite Course Objectives
AUTO 011B-Identify and interpret electrical/electronic system concern; determine necessary action.

Entrance Skills
Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.

Requisite Course Objectives
AUTO 011B-Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.

Entrance Skills
Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).

Requisite Course Objectives
AUTO 011B-Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).

Entrance Skills
Use wiring diagrams during diagnosis of electrical circuit problems.

Requisite Course Objectives
AUTO 011B-Use wiring diagrams during diagnosis of electrical circuit problems.

Entrance Skills
Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems

Requisite Course Objectives
AUTO 011B-Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.

Entrance Skills
Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

Requisite Course Objectives
AUTO 011B-Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

Entrance Skills
Perform battery state-of-charge test; determine necessary action

Requisite Course Objectives
AUTO 011B-Perform battery state-of-charge test; determine necessary action.

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

Requisite Course Objectives
AUTO 011B-Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

Entrance Skills
Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions

Requisite Course Objectives
AUTO 011B-Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.

Course Content
1. SP2 safety training.
2. Review of AUTO-011B material.
3. Body computer systems.
4. Vehicle communication networks.
5. Advanced electrical accessories.
6. Instrument panel and warning lamps.
7. Introduction to passive restraint systems.
8. Introduction to automobile alternative power sources.
9. Advanced Driver Assist Systems (ADAS).
10. Automotive industry web-based training modules.

Lab Content
1. Overview, safety & environmental protection.
2. Review of AUTO-011B material; lab activities.
3. Identify body computer systems on the vehicle.
4. Diagnose and repair vehicle communication networks.
5. Diagnose and repair advanced electrical accessories.
6. Diagnose and repair instrument panel and warning lamps.
7. Diagnose and repair passive restraint systems.

8. Diagnose advanced driver assist systems (ADAS).
9. Meet the Automotive Service Excellence (ASE) 2017 Master Automotive Service Technician (MAST) standards.

Course Objectives

	Objectives
Objective 1	Repair wiring harness (including CAN/BUS systems).
Objective 2	Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.
Objective 3	Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.
Objective 4	Identify system voltage and safety precautions associated with high intensity discharge headlights.
Objective 5	Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action.
Objective 6	Decipher the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.
Objective 7	Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action.
Objective 8	Diagnose incorrect horn operation; perform necessary action.
Objective 9	Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.
Objective 10	Diagnose incorrect electric lock operation; determine necessary action.
Objective 11	Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.)
Objective 12	Diagnose body electronic system circuits using a scan tool; determine necessary action.
Objective 13	Deduce module communication (including CAN/BUS systems) errors using a scan tool.
Objective 14	Hypothesize false, intermittent, or no operation of anti-theft systems failures.
Objective 15	Diagnose and repair basic advanced driver assist systems (ADAS).
Objective 16	Successfully complete SP2 safety training.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Demonstrate shop safety practices, given an automotive shop environment, a vehicle being serviced, with related service parts and fluids.
Outcome 2	Demonstrate diagnostic and repair knowledge and skills on an intermediate to advanced level electrical system malfunction, given industry standard service information and electrical tools.
Outcome 3	Model collaboration with within a team setting while troubleshooting an intermediate to advanced level electrical system malfunction.
Outcome 4	Apply research skills to intermediate to advanced level electrical system malfunctions, given industry standard service manuals, service bulletins, repair bulletin boards, automotive text books, and appropriate internet information.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Weekly discussion board may be posted.
Demonstration, Repetition/Practice	Repair orders during lab assignments.
Collaborative/Team	While working in the lab, learners will complete their assignments in teams.
Lecture	Content pertaining to subject material will be covered.
Laboratory	Information covered in lecture is practiced in a lab setting.
Discussion	Learners will participate in instructor-lead discussion.
Technology-based instruction	Diagnostic test equipment, computer-based tools, and virtual reality scenarios.

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	Book report, verbal presentations, or other research project may be assigned buy the instructor.	Out of Class Only
Student participation/contribution	Learners are required to analyze and complete assigned lab assignments.	In Class Only
Mid-term and final evaluations	Learners must demonstrate proficiency with course material by successfully completing mid-term and final evaluations.	In and Out of Class
Tests/Quizzes/Examinations	Learners must demonstrate proficiency with course material by successfully completing quizzes or exams.	In and Out of Class
Group activity participation/observation	Practice proper vehicle repair skills by completing lab activities.	In and Out of Class
Presentations/student demonstration observations	Book report, verbal presentations, or other research project may be assigned buy the instructor.	In and Out of Class
Laboratory projects	Practice proper vehicle repair skills by completing lab activities.	In Class Only
Written homework	Evaluate chapter material to successfully complete homework assignments.	Out of Class Only

Assignments

Other In-class Assignments

1. Review homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.
2. Begin 2 SP2 safety tests.
3. Participation in discussion related to topic of lecture.
4. Review and discuss vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
5. Learners will participate in group activities including, but not limited to role play, repair orders and interacting with customers.
6. Must develop teamwork skills through classroom interaction and discussion.
7. Learners will work in a team environment while performing assigned lab or classroom activities.

Other Out-of-class Assignments

1. Readings from required text: Assigned chapter reading from book and/or research based information.
2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.
3. Completion of 2 SP2 safety tests. Mechanical safety, Pollution prevention.
4. Assigned readings and written summaries from selected instructor handouts.
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.
7. Vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
8. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.
9. Must develop teamwork skills through lab activities and assigned special projects.
10. Automotive industry web-based training modules assigned and completed outside the class. Each module required a minimum of two hours.
11. A verbal or written presentation based from outside research pertaining to course content may be assigned by the instructor.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %
50
On-campus %
50

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?
Lab component of the course will be completed in a laboratory environment on campus under the supervision of an appropriate facilitator.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?
The facilitator will supervise all lab content, guiding the learner in productivity and understanding.

How will you assess the online delivery of lab activities?
Laboratory activities will not be delivered in the online setting, only in person.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?
Sp2 online safety training.

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.
SP2 - free account provided to all used to ensure the learners ability to distinguish safe working practices and conditions from unsafe practices and conditions.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:
Chat room/instant messaging
Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Video or audio feedback
Weekly announcements

External to Course Management System:
Direct e-mail
Synchronous audio/video

For hybrid courses:
Field trips
Orientation, study, and/or review sessions
Scheduled Face-to-Face group or individual meetings
Supplemental seminar or study sessions

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.
Regular effective contact will be practiced through online lecture, discussion board postings, email communications, regular announcements, prompt grading and feedback of assignments, and virtual office hours. This contact between the facilitator and learner on a regular basis will enhance learner confidence and understanding and promote critical thinking and analyzation of subject matter.

If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.
Interaction between instructor and learner will help to enhance learning and understanding of subject material.

Other Information

Provide any other relevant information that will help the Curriculum Committee assess the viability of offering this course in an online or hybrid modality.

With the uncertainty of the teaching environment, enabling the lecture portion of this course to be delivered in an online setting, while keeping the hands on portion face-to-face, will ensure learners can access needed training to ensure knowledge and experience is achieved to gain employment in the automotive field.

MIS Course Data

CIP Code

47.0604 - Automobile/Automotive Mechanics Technology/Technician.

TOP Code

094800 - Automotive Technology

SAM Code

B - Advanced 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

General Education Status

Y = Not applicable

Support Course Status

N = Course is not a support course

Allow Audit

Yes

Repeatability

No

Materials Fee

No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
3/17/2022

Academic Senate Approval Date
3/24/2022

Board of Trustees Approval Date
4/22/2022

Chancellor's Office Approval Date
5/06/2022

Course Control Number
CCC000631390

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 Braking Systems Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=109)
Automotive Light and Medium Duty Diesel Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=111)
Automotive 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)
Automotive AI Autonomous Vehicle Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=360)
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)