AUME-781: AUTOMOTIVE ELECTRICAL/ELECTRONICS II

Effective Term
Fall 2026

BOT Approval Date
12/11/2025

Discipline
AUME - Automotive/Transportation Tech
Course Number
781

Course Title
Automotive Electrical/Electronics II

Short Title
Auto Electrical/Electronics II

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
2.00

Lab Units
2.00

Total Units
4.00

Hours

Lecture Contact Hours
32-36
Out of Class Hours Lecture
64-72

Lab Contact Hours
96-108
Out of Class Hours Lab
0.00

Total Contact Hours
128 - 144

Total Out of Class Hours
64 - 72

Total Student Learning Hours
192 - 216

Is this an existing Extensive Lab?
No

Do you want to propose this for Extensive Lab?
Yes

Distance Education
Yes

Distance Education

Distance Education Type
Hybrid Only

What will be done in face-to-face meetings
This course consists of the introduction of the theory and operation of the electronic circuits utilized in the construction of modern automobiles. As such, we intend to introduce most of that theory in the online setting whenever the course is offered in its hybrid form, and actually apply that theory in the laboratory setting afterwards. In other words, the course, when it is offered in its hybrid form, will consist of online lecture and face-to-face laboratory sessions.
For example, one of the tasks required by our third-party accreditation body, the ASE Education Foundation, is to require our students to demonstrate knowledge of the use of special multimeters, insulated tools, and other test equipment required for use in high-voltage circuits; the types of equipment required to do this, such as megaohm and milliohm meters and the basic operating characteristics of those meters will be introduced online, and then students will use those pieces of equipment to perform actual measurements, which consist of what is known as an isolation test, in the lab setting at the next face-to-face meeting, which we anticipate will be either once or twice weekly, depending on our scheduling requirements and availability.

Are you using publisher content?
No

Regular Substantive Interaction
Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods: • Orientation - Students must be oriented to the online and face-to-face portions at the start of the course. • Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc. • Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction. • MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students. • Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS. • Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Additional Regular Substantive Interaction
As we have already stipulated in the above section, this course, when it is offered in its hybrid form, will consist of online lectures and face-to-face laboratory exercises. Therefore, students will interact with each other and with their instructor at least once or twice weekly, for 18 to 32 meetings depending on how the course is scheduled.
The face-to-face meetings will consist primarily of laboratory exercises, in the course of which students will document their work on a lab sheet and that work will be evaluated at that time by the instructor of the course.

Catalog Description
This course encompasses the theory and operation of modern vehicle electronic systems. The primary focus of the course is to provide instruction on reading and interpreting wiring diagrams at an advanced level and then utilizing state-of-the-art test equipment, such as megaohm and milliohm meters and multi-channel oscilloscopes to assess the condition of vehicle electronic circuits. The course is intended to supplement our Automotive Electrical and Electronics I course in preparing students to take and pass the ASE A6 Electrical and electronic Systems exam.

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)
AUME-780 (with a grade of C or better).

Codes

TOP Code (CB 03)

0948.00* - *Automotive Technology

CIP Code

47.0604 - Automobile/Automotive Mechanics Technology/Technician.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Automotive Technology	End

Learning Objectives

Learning Objectives

Learning Objective
1. Predict the behavior of electronic circuit operation utilizing the principles of Ohm's Law.
2. Evaluate the operation of electrical and electronic components.
3. Verify operation of instrument panel gauges and warning/indicator lights.
4. Diagnose operation of entertainment/infotainment systems and related circuits.
5. Formulate procedures to safely deenergize/disable and energize/enable high-voltage systems.
6. Display knowledge of special multimeters, insulated tools, and other test equipment required for use in high-voltage circuits.
7. Compare and contrast advanced driver assistance systems (ADAS) and related circuits, such as active cruise control and collision avoidance.
8. Diagnose charging system for causes of undercharge, no charge, or overcharge conditions and formulate strategies to repair the problem.
9. Organize a live-dead-live/zero potential test to verify circuit isolation of the high-voltage battery or energy storage system.
10. Examine ways in which Advanced Driver Assistance Systems (ADAS) help to ensure an equitable driving environment for individuals struggling with subtle disabilities such as depth perception problems, night-vision issues and reduced reaction times.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will use graphing multi-meters (GMM) or digital storage oscilloscopes (DSO) to diagnose electrical and electronic circuits.
2. Students will interpret published service information to locate and service electrical and electronic components in modern vehicles.
3. Students will perform live-dead-live/zero potential tests to verify circuit isolation of high-voltage battery systems.
4. Students will diagnose and calibrate Advanced Driver Assistance Systems (ADAS) components while considering accessibility features and diverse user needs.

Content

Course Lecture Content

1. General Electrical and Electronic Theory and Operation
    a. Automotive Electrical/Electronics and Workplace Safety
        i. S/P2 Online Safety Certification
            1. S/P2 Hazardous Pollution Prevention Certification
            2. ALI Lifting It Right Certification
    b. Review of Automotive Database Utilization
        i. Service Information
            1. System Description and Operation
            2. Wiring Diagrams
            3. Locating Vehicle Electrical/Electronic Components
    c. Identification of Electrical/Electronic Systems
        i. Individual System Components
        ii. System Configuration Types
    d. Scan Tool Data Interpretation
        i. Diagnostic Trouble Code (DTC) Classifications
            1. Powertrain Control Module (PCM) Code Prefixes
            2. Body Control System (BCM) Code Prefixes
            3. Chassis Control System (CCM) Code Prefixes
            4. Communication Fault (U-Code) Prefixes
    e. Calibration, Initialization or Relearn Procedures, Tools and Equipment
        i. Scan Tools
        ii. Pass-Through Devices
    f. Review of the Laws of Electricity
        i. Ohm's Law
        ii. Watt's Law
        iii. Kirchhoff's Law
    g. How to Read Wiring diagrams
        i. SAE Type
        ii. DIN Type
2. Vehicle Batteries
    a. Low Voltage Batteries (12 Volt)
        i. Flooded Lead-Acid Types
            1. Low Maintenance
            2. Maintenance Free
        ii. Absorbed Glass Mat (AGM)
            1. Flat-Plate AGM
            2. Spiral AGM
        iii. Gel Type
    b. High Voltage Batteries
        i. Nickel Metal Hydride (NiMH)
        ii. Lithium Ion
3. Starting Systems
    a. Voltage Drop and its Effect on the Starting System
    b. Differentiating a Mechanical vs. an Electrical Cranking Issue
    c. Identifying Starter Types
        i. Brushed Field Magnet Type
        ii. Permanent Magnet Starter Motors
        iii. Movable Pole Shoe Starter Types
        iv. Hybrid Vehicle Starting Systems
4. Charging Systems
    a. Low-Voltage (12 Volt) Charging Systems
        i. Integral Regulator Alternators
        ii. Stand-Alone Regulated Voltage (SARV)
        iii. Regulated Voltage (PCM Controlled)

- b. Voltage Drop and its Effect on the Charging System
  - i. How to measure Voltage Drop on the Charging System
    1. On the High (Power) Side
    2. On the Low (Ground) Side
- c. Inspection of the Accessory Drive Belt System (ADBS)
  - i. Locked Center-Drive Types
  - ii. Automatic Tensioner Types

5. Lighting Systems
   - a. Federal Regulations Governing Headlamp Design
   - b. The Sealed Beam
   - c. Composite Headlamp Assemblies
   - d. HALO Lighting Types
   - e. Light Emitting Diode (LED) Headlights
   - f. High Intensity Discharge (HID) Headlights
     - i. Safety Precautions Related to HID Service
     - ii. HID Bulb Replacement Procedures
   - g. Adaptive Headlight Systems
6. Instrument Cluster and Driver Information Systems
   - a. Cluster Input (Sensor) Types
   - b. The Bulb-Check Routine
7. Body Electrical and Electronic Control Systems
   - a. Advanced Driver Assist Systems (ADAS)
     - i. How Advanced Driver Assist Systems Benefit Certain Groups
       1. People Who Struggle With "Quiet" or "Soft" Disabilities
          - a. Depth Perception Issues
          - b. Night Vision Problems
          - c. Slow Reaction Times
   - b. Anti-Theft System Operation
   - c. Entertainment and Comfort (E & C) Buses
   - d. Supplemental Inflatable Restraint (SIR) Systems
     - i. Inputs (Collision Sensors)
     - ii. Outputs (Inflator Modules)
       1. Air Bag Modules
       2. Seat Belt Pretensioners
   - e. How ADAS Systems are Recalibrated
     - i. When is Recalibration Required
     - ii. Techniques Employed for Recalibration
8. xEV (Hybrid/Electric Vehicle) Systems
   - a. Safety Precautions Used for xEV Service
     - i. Personal Protective Equipment (PPE)
     - ii. Ignition Key Lock Boxes
     - iii. Test Equipment Requirements
       1. CAT III Digital Multi-Meters
       2. Mega-Ohm Meter Use
       3. Isolation Testing
   - b. Understanding Safety Procedures Associated with High-Voltage A/C Compressors and Wiring.
   - c. Theory and Operation of High-Voltage Thermal Management Systems
   - d. Safety Precautions Associated with High-Voltage Powertrain Components, such as Electric Motors.

Course Lab Content

1. General Electrical and Electronic Diagnosis and Repair
   - a. Scan Tool Usage
     - i. Retrieve and Record On-Board Diagnostic Trouble Codes and Freeze Frame Data; Clear Codes and Data when Directed
     - ii. Perform Calibration/Recalibration, Initialization, or Relearn Procedures as Required
     - iii. Demonstrate Proper Use of a Digital Multimeter (DMM)
     - iv. Demonstrate the Use of Wiring Diagrams to Perform the Diagnosis of Electrical/Electronic Circuit Problems
     - v. Test Circuit Operation Using an Oscilloscope or Graphing Multimeter (GMM)

2. Vehicle Battery Diagnosis
    a. Perform a Low-Voltage Battery State-of Charge Test
    b. Maintain or Restore Electronic Memory Functions as Necessary
    c. Identify Electronic Modules, and Other Accessories that Require Reinitialization or Code Entry After Disconnecting/Reconnecting the Vehicle Battery
3. Cranking System/Vehicle Propulsion System Diagnosis
    a. Perform Starter Current Draw Testing to Differentiate Between Mechanical or Electrical Issues
    b. Demonstrate the Performance of Starter Circuit Voltage Drop Testing
    c. Diagnose a No-crank Condition using a Wiring Diagram and Test Equipment on a Bugged Vehicle or Trainer Unit
4. Charging System Assessment and Diagnosis
    a. Perform Charging Circuit Voltage Drop Testing
    b. Test Alternator Diodes with an Oscilloscope for Excessive Diode Ripple
5. Lighting System Diagnosis and Repair
    a. Diagnose the Cause of Brighter-Than-Normal, Intermittent, Dim, Headlight Operation or Test Inoperative Headlamps
    b. Inspect the Interior and Exterior Lamp Circuits
    c. Diagnose Issues Related to Inoperative Active Headlamps
6. Instrument Cluster and Driver Information System Repair
    a. Verify the Operation of Instrument Panel Gauges and Warning Lights
    b. Inspect and Test Gauges and Gauge Sensors to Resolve Abnormal Indicator Complaints
    c. Diagnose the Causes of Incorrect Operation of Warning Devices and Other Driver Information Systems
    d. Diagnose/Repair/Recalibrate ADAS Systems
        i. Note the Negative Effects Inoperative Systems would have on Marginalized Populations with "Quiet" or "Soft" Disabilities
        ii. Document the ADAS Recalibration and Repair Process
7. Body Electrical System Service and Repair
    a. Diagnose Problems with Vehicle Comfort, Convenience, Access, Safety, and Related Systems Operation
    b. Diagnose Customer Complaints Related to Security/Anti-Theft and Related Systems
    c. Verify the Proper Operation of Safety Systems and Related Circuits (Such as: Horn, Airbags, Seat Belt Pretensioners and Occupancy Classification
    d. Diagnose Body Electronic Systems using a Scan Tool
    e. Diagnose Module and Computer Network Communications Issues
    f. Demonstrate Knowledge of the Process for Software Transfer, Software Updates, or Reprogramming/Reflashing of Electronic Modules
8. xEV System Diagnosis and Repair
    a. Demonstrate the Performance of Procedures Intended to Safely Deenergize or Disable and Energize Enable High-Voltage Systems
    b. Demonstrate Knowledge of Special Test Equipment, Insulated Tools, and other Equipment Necessary to Test High-Voltage Circuits
    c. Demonstrate Knowledge of the Performance of a Live-Dead-Live/Zero Potential Test to Verify Isolation of the High-Voltage Battery Systems
    d. Demonstrate the Identification of Personal Protective Equipment Intended for use when Servicing High-Voltage Electrical Systems
    e. Demonstrate Knowledge of High-Voltage Thermal Management Systems
    f. Demonstrate knowledge of Best Practices Associated with High-Voltage Powertrain Components, such as Electric Propulsion Motors

Methods of Instruction

Method

Observation and Demonstration

Integration

The instructor of the course will demonstrate the performance of a live-dead-live or "zero-potential" test to verify that the high-voltage battery system of a hybrid or electric vehicle (HEV) has been disabled or disconnected and thus rendered safe to service.

DE Adaptations for MOI

This procedure can be demonstrated using an accessible video format readily available on the CMS using an actual vehicle or a specialized HEV Trainer unit.

Method
Individual Projects

Integration
Students will be asked to write a one to two page paper, present a visual or audio presentation of equivalent length describing how ADAS systems have helped a driver with depth perception problems, night-vision difficulties or hearing problems to adapt to situations that would otherwise present some serious challenges or unsafe situations.

DE Adaptations for MOI
The student's one to two page paper, audio or visual presentation could be submitted through the CMS or in person during one of the course's regular face-to-face meetings. Materials for student research will include accessible vehicle manufacturer's training modules which are readily available to all of our students on the CMS.

Method
Activity

Integration
Students will be asked to trace the high (power) side and the low (ground) side of a designated electrical circuit on a wiring diagram that is presented in print form with alternative text provided through the CMS. Students will also be asked to designate which fuses or circuit protection devices supply power to the circuit and to specify the ground locations for the same circuit; this designation may be made in audio, video or other visual form to allow accessibility.

DE Adaptations for MOI
Electrical diagrams are available online through most automotive database systems, which provide alternative text to assure accessibility; the systems allow various parts of the circuit diagrams to be traced electronically and reproduced as a PDF file, a detailed audio description or a visual presentation which would be submitted online through the CMS, along with an electronic file describing the fuse or circuit protection devices and the circuit ground locations.

Method
Experiments

Integration
Students will be asked to identify the different types of prescribed high-voltage safety equipment. This would include being able to differentiate a required CAT III Digital Multi-Meter from other types, select the proper protective gloves and verify their expiration date, and identify other required safety equipment related to high-voltage diagnosis and service.

DE Adaptations for MOI
The above tasks would ideally be performed in person during one of the hybrid course's face-to-face meetings, but the assignment could also be completed online by showing the students accessible visual or audio presentations of the same types of equipment online through the CMS and then asking them to identify the equipment that is suitable for use when dealing with high-voltage diagnosis and service; the student description can be submitted through the CMS in visual, video or audio forms to assure accessibility.

Methods of Evaluation

Method
Exams/Tests

Integration
Quizzes and exams based on the lectures and reading materials will be administered to the students on a regular basis in order to determine the degree of understanding that the students are achieving about the theory and operation of the modern vehicle's electrical system. Evaluations will be made based on the conformity of the student responses to industry standards.

DE Adaptations for MOE

These quizzes and exams are usually administered online through the CMS in any case; the textbook publishers provide accessible versions of these quizzes for student use, so little if any alteration would be necessary to adapt this Method of Evaluation to Distance Education. Student feedback will be provided immediately after student submission of the quiz, exam or test through the grade center available through the CMS.

Method

Final Performance

Integration

Students will be required to diagnose an electrical or electronic fault on a bugged vehicle or a trainer unit within the period of time normally specified for the task by one of our online databases. The databases, which are the Alldata or Mitchell ProDemand systems, represent nationally recognized industry standards. Evaluation will be based on whether an accurate diagnosis was made within the time period allotted.

DE Adaptations for MOE

This course is intended to be delivered in the hybrid format only. This particular method of evaluation would be very difficult to adapt to distance education; therefore, it is intended to be administered during one of the course's numerous face-to-face meetings.

Method

Simulation

Integration

The lab exercises for this course are designed to allow the student to practice the various service procedures required for electrical and electronic diagnosis. The procedures are prescribed by the department's third-party accreditation body. Students will be required to perform the various tasks in the automotive lab setting; their performance will be evaluated according to the conformity to generally accepted industry practices and the ability of the student to perform the task within the time allotted by industry standards.

DE Adaptations for MOE

As was the case with the Final Performance Method of Evaluation, this evaluation of this method will also need to be completed in the laboratory setting during one of the course's numerous face-to-face meetings.

Method

Papers

Integration

Students will write a one to two page paper discussing how Advanced Driver Assist Systems (ADAS) has made driving the modern vehicle safer and easier for those who struggle with various "quiet" or "soft" disabilities, such as depth perception, night vision, or reaction time issues. Evaluation will be made according to the extent of the knowledge that the student displays concerning the ways these systems have made driving more accessible, equitable and inclusive for the members of these groups, who might otherwise be marginalized in today's highly mobile society.

DE Adaptations for MOE

This paper could be submitted online in visual, audio or video form through the CMS, so the adaptation for distance education would not actually require much special consideration. Feedback to the student will be made available within one week of submission through the grade center available on the CMS.

Assignments

Assignment Type

Reading

In-class and/or outside of class
Outside of class

Formative or Summative
Formative

Assignment
Read Chapters 7 and 8 of Auto Electricity and Electronics, which cover the basic tools and test equipment and the essential electrical tests performed on modern vehicles. Be prepared to discuss how to use a Digital Multi-Meter (DMM) to perform a live-dead -live, or "zero potential" test to determine verify that the medium or high-voltage electrical system on a Hybrid or Fully Electric Vehicle has been disabled.

How assignment will be adapted in online format
This reading assignment (Chapters 7 and 8 of Auto Electricity and Electronics) will be presented in accessible form on the CMS; students will be asked to participate in a discussion board assignment that covers the essential steps in order. The test itself will be made available through an accessible simulation that can be completed online through the CMS, and feedback will be provided to the students through the CMS according to the student's adherence to the safety precautions and results required by the test simulation.

Assignment Type
Other

In-class and/or outside of class
Outside of class

Formative or Summative
Formative

Assignment
Examine ways in which Advanced Driver Assistance Systems (ADAS) have helped to alleviate issues that some individuals, such as those who struggle with night-vision, depth perception or reaction time difficulties have equitable driving opportunities and compose a one-to-two page paper discussing the issue. Feedback concerning student performance of the assignment will be given in person on a one-to-one basis.

How assignment will be adapted in online format
Students will be able to participate in a discussion board debate about how these issues have been addressed on the CMS; feedback concerning student participation in this assignment will be made available through active instructor participation in the discussion.

Assignment Type
Other

In-class and/or outside of class
In-class

Formative or Summative
Formative

Assignment
Perform a calibration, recalibration, relearn or initialization procedure on an electronic control module.

How assignment will be adapted in online format
This assignment will be performed in the face-to-face setting during one of the laboratory exercises; the course cannot be offered fully online, so this would only apply when the course is offered in its hybrid form.

Assignment Type
Other

In-class and/or outside of class
In-class

Formative or Summative
Summative

Assignment
Perform a diagnostic procedure on the bugged electronic circuit of either an actual vehicle or a trainer unit using a scan tool. digital multi-meter or oscilloscope.

How assignment will be adapted in online format
Once again, this course is only intended to be offered in the fully face-to-face or hybrid format, and this assignment will need to be completed in the laboratory setting under the supervision of the instructor of the course.

Assignment Type
Writing

In-class and/or outside of class
Outside of class

Formative or Summative
Formative

Assignment
Prepare a written work order that conforms to he regulatory requirements of the California State Bureau of Automotive Repair (BAR). The work order must include customer identification and contact information, an accurate description of at least one simulated customer electrical or electronic system complaint, the cause identified for the complaint and the proposed correction of the complaint. The work order must include an estimated cost for repairs and an itemized list of component and labor costs. Feedback will be given to the student within five days of submission.

How assignment will be adapted in online format
This assignment can be submitted online through the CMS; the necessary information for the simulation would be transmitted through the CMS in accessible form, along with an accessible version of State BAR Standards, which is readily available online through the Department of Consumer Affairs website. The submission will be prepared using an electronic work order preparation system which the automotive department subscribes to; the system provides accessibility for the visually impaired. Feedback about the assignment will be given to the student within five days of submission thorough the grade center available on the CMS.

Course Materials

Textbooks
Duffy, J. and Dr. Chris McNally (2026) Auto Electricity and Electronics, 8th Edition. Goodheart and Willcox Publisher ISBN: 979-8-88817-208-7

Other Resources
ALLDATA Online Automotive Repair Information
Mitchell ProDemand Automotive Repair Information

Class Size Information

Class Size
24

Class Size Category
J - Specialty lab

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

This course deals largely with the diagnosis and service of advanced driver assistance systems (ADAS), which are intended to enhance the driver's ability to perform certain driving tasks, such as maintaining a safe driving distance and avoiding unwanted lane departures. ADAS systems therefore improve safety primarily by reducing the workload on the driver, thus ensuring an equitable and accessible driving environment for individuals struggling with what might best be described as "quiet" disabilities, such as depth perception problems, night-vision issues and reduced reaction times.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

The majority of the evaluations, such as the textbook chapter quizzes, utilized for this course allow the students to make multiple attempts to complete them, which will encourage students to work at improving their performance over time. The laboratory interactions often require that the students support one another so that every student will be able to contribute to the performance of the required tasks by utilizing their strengths to assist the group. The methods of instruction, which include lecture, reading assignments, physical demonstration and hands-on experience are intended to provide an environment amenable to visual, auditory, read/write, and kinesthetic learners and the course content provides instruction about systems that students will use in the course of their everyday activities.

Interactions

Explain how the course will incorporate student-to-student interaction.

This course incorporates a considerable amount of electrical theory with the practical, actual operation of the electronic circuits in use on modern automobiles such as those in collision avoidance and lane departure systems. Since the students in this course will need to perform their laboratory activities as members of teams of three or four students, they will need to share the responsibilities for the respective stages of those activities and depend on one another in order to perform the work within the time that is normally allotted for it. For example, one student will need to refer to the published service information to determine the intended description and operation of a system, such as park assistance, while another will be responsible for locating the circuit wiring diagram, and another student will need to locate the actual components on the vehicle. Finally, they will need to share the responsibility of determining what type of equipment will be necessary to diagnose issues they encounter on vehicles or trainers that have had realistic bugs introduced into them by the instructor of the course. Some assignments, such as the "Live-Dead-Live" test listed above are able to be performed through accessible online simulations; these assignments will be accompanied by discussion board interactions conducted in accessible form on the CMS which will allow the students to coach each other about their respective performance of the tasks involved.

Explain how the course will incorporate instructor-to-student interaction.

Much of the course involves diagnostic and service operations that need to be performed on the medium and high-voltage circuits employed on hybrid and electric vehicles (HEVs). Since those types of circuits obviously require extensive safety considerations, instructor demonstration of the various diagnostic and service procedures related to those circuits will be essential. Additionally, the instructor will need to be present during the lab activities to assure that safety procedures are being complied with and to offer coaching about how various diagnostic and repair techniques can be performed in the most efficient fashion; therefore, more than adequate instructor-to-student interaction will be an integral part of this course.

Explain how the course will incorporate student-to-content interaction.

Students will need to compare the actual operation of an electrical circuit with the expected operation of the circuit; for example, very high resistance is expected when using a megaohm meter to perform what is known as an isolation test, and the student will need to be mindful of that fact and put it to consistent use. This consistent comparison between expected circuit operation and actual circuit operation will provide ample student-to-content interaction.

Explain how the course will incorporate student-to-self interaction (metacognitive).

The automotive industry depends on widely accepted and published industry standards to determine how much time needs to be allotted to the performance of specific tasks; in this course, for example, a period of 50 minutes is the generally accepted period allotted to disable the high-voltage electrical system used on the Toyota Prius. Students will need to compare their own performance with the industry standard, challenge themselves about whether they were able to meet that standard and ask themselves how they might have been able to perform the procedure faster or in a safer fashion. This will necessitate that the student think critically about their own performance, which, in turn, will provide the necessary student-to-self interaction required for success in this course.

Key: 396