



AUME-700: INTRODUCTION TO AUTOMOTIVE TECHNOLOGY

Effective Term

Fall 2026

BOT Approval Date

05/15/2025

Discipline

AUME - Automotive/Transportation Tech

Course Number

700

Course Title

Introduction to Automotive Technology

Short Title

Introduction to Auto Tech

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

3.00

Lab Units

1.00

Total Units

4.00

Hours

Lecture Contact Hours

48-54

Out of Class Hours Lecture

96-108

Lab Contact Hours

48-54

Out of Class Hours Lab

0.00

Total Contact Hours

96 - 108

Total Out of Class Hours

96 - 108

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

No

Catalog Description

This course covers the theory of operation of automobiles and light trucks. The eight basic areas of automotive technology are explored. Special emphasis is placed upon entry into the automotive repair industry as a career choice. In order to provide some practical experience and impart skills intended to augment student employability, some basic maintenance and inspection procedures are performed as part of the coursework.

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. Apply clean orderly work habits and identify the safe use of chemicals, tools and fire protection equipment.
2. Construct a work order as per industry standards.
3. Classify vehicle types and their component parts.
4. Examine the desirable aspects of automotive technology as a career choice.
5. Assess and compare the different types of auto repair businesses, their procedures and the related local, state and federal laws governing their operation.
6. Examine the eight basic operating systems of automobiles and light trucks, including hybrid and electric vehicles.
7. Set up and perform a vehicle multi-point inspection.
8. Select common shop tools to perform basic maintenance operations.
9. Evaluate local job openings and career opportunities.
10. Inventory the contributions made to automotive technology by women, such as Mary Anderson's invention of the windshield wiper.

Learning Outcome Information**Course Learning Outcomes**

Learning Outcome
1. The student will be able to differentiate between the eight basic subsystems that are used to construct the modern automobile.
2. The student will exhibit knowledge of the contributions that women have made to the advances in automotive technology.

3. The student will display the ability to perform a basic multi-point inspection on a vehicle.
4. The student will exhibit the ability to correctly diagnose a basic fault on one of the basic vehicle subsystems.

Content

Course Lecture Content

1. Safety, Workplace Information Technology, Tools and Equipment
 - a. Online Automotive Safety and Hazardous Materials Training (SP/2)
 - b. Navigating Online Automotive Service Information
 - i. ALLDATA
 - ii. Mitchell ProDemand
 - c. Preparing a Work Order
 - i. California State Standards
 - ii. The "Three Cs"
 1. The Customer Complaint
 2. The Cause of the Complaint
 3. The Correction of the Complaint
 - d. Commonly Used Automotive Tools and Equipment
 - i. Hand Tools
 1. Automotive Fastener Identification
 2. Principles of Mechanical and Electronic Torque
 - ii. Power Tools
 - iii. Automotive Lifts and Floor Jacks
 - e. Contributions That Women Have Made to the Advance of Automotive Technology
 - i. Mary Anderson's Invention of Windshield Wipers (1903)
 - ii. Margaret Willcox's Invention of Car Heating Systems
2. Internal Combustion Engine (ICE) Repair Principles
 - a. The Four-Cycle (Otto Cycle) Process
 - b. Common Engine Dimensions
 - i. Engine Design Descriptions
 - ii. Engine Displacement Dimensions
 - iii. The Compression Ratio
 - iv. The Stoichiometric Ratio
 - c. Internal Combustion Engine Designs
 - i. Spark Ignition Engines
 - ii. Compression Ignition Engines (Diesel)
 - d. Internal Combustion Engine Components
 - i. The Lower End
 1. The Crankshaft
 2. Pistons and Connecting Rods
 3. Piston Ring Operation
 - ii. The Upper End
 1. Cylinder Head Design and Valve Operation
 - a. Camshaft and Timing Components
 - b. Gaskets and Seals
3. Automatic Transmission Technology
 - a. Operating Principles
 - i. Planetary Gearset Operation
 - ii. The Torque Converter
 - iii. Basic Hydraulics (Pascal's Law)
 - iv. Fluid Types
4. Manual Transmission Technology
 - a. Clutch Operation
 - b. Basic Gear Operation
 - c. Transfer Cases and Viscous Clutches
 - d. Principles of the Differential or Final Drive
5. Steering and Suspension Systems

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- a. Steering Systems
 - i. Conventional Steering
 - 1. Steering Components
 - ii. Rack and Pinion Steering
 - 1. Hydraulic Power Steering
 - 2. Electric Power Assisted Steering (EPAS)
 - iii. Suspension Designs
 - 1. Short/Long Arm (SLA) Types
 - 2. MacPherson Strut Suspensions
 - 3. Multi-Link Suspensions
 - iv. Tires and Wheels
 - 1. Tire Design and Dimensions
 - a. Rotation Principles
 - b. Tire Balance
 - c. Tire Inflation and Tire Pressure Monitoring Systems (TPMS)
 - v. Wheel Alignment Principles
 - 1. Caster
 - 2. Camber
 - 3. Toe
 - 4. Thrust Angle
 - 6. Automotive Brake Systems
 - a. Disc Brakes
 - i. Fixed Caliper
 - ii. Floating Caliper
 - iii. Components
 - 1. Brake Pads
 - 2. Brake Calipers
 - b. Drum Brakes
 - i. Dual-Servo Types
 - ii. Non-Servo Types
 - iii. Brake Components
 - 1. Brake Shoes
 - 2. Brake Drums
 - c. Brake Hydraulic Components
 - i. Fluid Types
 - ii. The Primary Cylinder
 - iii. The Brake Warning System
 - iv. The Brake Lights
 - 7. Automotive Electrical and Electronics
 - a. Capabilities of the Digital Multi-Meter (DMM)
 - i. Voltage
 - ii. Amperage
 - iii. Resistance
 - b. The Starting and Charging Systems
 - i. Automotive Battery Designs
 - 1. Low Maintenance
 - 2. Maintenance Free
 - 3. Absorbed Glass Matt (AGM) and Gel-Type Batteries
 - ii. The Generator
 - 1. The Accessory Drive Belt System (ADBS)
 - iii. The Starting System
 - 8. Heating, Ventilation and Air Conditioning (HVAC)
 - a. Principles of Mechanical Refrigeration
 - i. Refrigerant Types
 - ii. Expansion Valve Types
 - b. Basic Ventilation System Design
 - 9. Engine Performance Principles

- a. Basic Control Module Operation
 - i. Diagnostic Trouble Codes (DTCs)
 - ii. Inspection and Maintenance Monitors (I/MMs)
 - b. Ignition System Designs
 - i. Distributor Ignition
 - ii. Wasted Spark Ignition
 - iii. Coil-Per-Plug Ignition
 - iv. Spark Plug Operation
 - c. Engine Fuel Systems
 - i. Fuel Injection Types
 - 1. Throttle Body Injection (TBI)
 - 2. Port Injection
 - 3. Gasoline Direct Injection
 - 4. Fuel Pump Design and Location
10. Introduction to Hybrid/Electric Vehicle (HEV) Technology
- a. Personal Protective Equipment for HEVs
 - i. Class 0 Insulated Gloves
 - ii. CAT-III Electrical Meters
 - iii. The "Hot Stick"
 - b. High-Voltage Circuit Identification
 - i. Wiring Conduit Coloring
 - 1. The High-Voltage Disconnect (Service Plug)

Course Lab Content

- 1. Safety, Workplace Practices, Tool and Equipment Identification
 - a. Tool Identification
 - i. Specialized (Torque) Tools
 - ii. Power Tools
 - iii. Hand Tools
 - b. Vehicle Lifting
 - i. Using the Automotive Lift
 - ii. Using Floor Jacks and Jack-stands
 - iii. Using Torque Devices
 - 1. Using the Torque Wrench
 - 2. Using the Torque-Stick
- 2. Internal Combustion Engine Testing
 - a. Mechanical Testing
 - i. Performing a Compression Check
 - ii. Measuring Intake Manifold Pressures
 - b. Lubrication System Procedures
 - i. Changing the Oil and Filter
 - ii. The Multi-Point Inspection (MPI)
 - c. Cooling System Procedures
 - i. Inspecting Coolant Level and Condition
 - ii. Pressure Testing the Cooling System
- 3. Automatic Transmission Technology
 - a. Fluid Inspection
 - i. Fluid Level Inspection
 - ii. Fluid Condition Inspection
 - iii. Testing for Leaks
 - iv. Checking the Case Vent
- 4. Manual Transmission Technology
 - a. Transfer Case and Differential Fluid Inspection
 - i. Fluid Level Inspection
 - ii. Fluid Condition Inspection
 - iii. Checking the Case Vent
- 5. Steering and Suspension Systems

- a. Tire Service
 - i. Tire Rotation
 - 1. Tire Pressure Monitoring System Reset
 - ii. Identification of Wear Patterns
 - iii. Tire Balance
 - iv. Tire Inflation Inspection
 - v. The Wheel Alignment Check
- 6. Automotive Brake Systems
 - a. Brake Fluid Inspection
 - i. Fluid Level Inspection
 - ii. Fluid Condition Inspection
 - b. Checking the Brake Pad Wear
- 7. Automotive Electrical and Electronics
 - a. Battery Inspection
 - i. Size and Capacity Verification
 - ii. Checking the Hold-Down
 - b. Battery Operation Inspection
 - i. State-of-Charge (SOC) Test
 - ii. Parasitic Draw Test
 - iii. Conductance Meter Test
 - c. Generator Operation Testing
 - i. Charge Rate
 - ii. Charge and Ground Circuit Voltage Drop Testing
 - iii. Accessory Drive Belt System (ADBS) Inspection
- 8. Heating, Ventilation and Air Conditioning (HVAC)
 - a. Contributions Women Have Made To Automotive HVAC
 - i. Margaret Willcox and Car Heaters
 - b. Checking and Changing the Cabin Air Filter
 - c. The A/C System Performance Check
- 9. Engine Performance Principles
 - a. Perform Scan-Tool Testing
 - i. Retrieve and Clear Diagnostic Trouble Codes (DTCs)
 - ii. Perform I/MM Monitor Verification
 - iii. Perform Fuel-Trim (Lambda) Test
 - b. Ignition System Service
 - i. Identify Ignition System Types
 - ii. Replace Spark Plugs
 - c. Fuel Injection System Service
 - i. Identify Fuel Injection System Types
 - ii. Perform Low-Pressure Fuel Pump Operation (Pressure) Test
- 10. Introduction to Hybrid/Electric Vehicle Technology
 - a. Verify High-Voltage Protective Glove Certification
 - i. Certification Class
 - ii. Certification Date
 - b. Verify DMM Certification and Condition
 - i. Verify DMM Classification
 - ii. Verify Test Lead Operation and Condition
 - iii. Verify DMM Fuse Condition
 - c. Locate the High-Voltage Service Plug
 - d. Perform a Live-Dead-Live Test (Simulator)

Methods of Instruction

Method

Live Performance Viewing

Integration

The instructor will demonstrate the proper techniques used to perform the various shop procedures required by the needs of this course, such as attaching and retrieving failure data from a vehicle control module. The demonstration will emphasize workplace professionalism, the amount of time that the task should require, and the need for accuracy when performing the task at hand.

Method

Papers and Reports

Integration

Students will exhibit the ability to prepare a work or repair order according to the standards prescribed by the State of California's Bureau of Automotive Repairs. Emphasis will be placed on the requirements demanded by the legal aspects of the document.

Method

Lecture

Integration

The instructor will discuss the theory of operation and the procedures normally used to diagnose problems with the eight basic automotive subsystems described in the lecture and lab outlines for the course. Emphasis will be placed upon the application of those principles and techniques to the lab exercise that is intended to follow.

Method

Reading

Integration

Students will be required to read the appropriate textbook chapter or chapters that discusses the theory of operation and describes the component parts of the automotive subsystem under discussion for the relevant area of the class.

Method

Role Playing/Simulation

Integration

Students will participate in simulated diagnostic scenarios utilizing the specialized trainer units that the department possesses. Since these units isolate an automotive subsystem on a trainer board, there are few if any issues concerning access to components, and often the performance of the individual system components can be "seen" and not merely heard through the operation of the board's indicator lamps, which will make for an equitable experience for those students who might be hearing-impaired. A number of "bugs" can be inserted into the trainer by the instructor, which will assist in honing the student's diagnostic skills.

Method

Online Activity/Discussion

Integration

Students will be asked to comment on the contributions that various women have made to the advance of automotive technology from its early days forward. The instructor of the course will initiate the discussion and guide it, but students will be responsible for commenting on the importance of the contributions, such as the invention of Kevlar fibers used to reinforce tires by Stephanie Kwolek.

Methods of Evaluation

Method

Exams/Tests

Integration

Quizzes will be given on the identification of components related to the eight basic automotive subsystems and the theory of operation of those systems; this includes the construction of and theory and operation of the engine, the transmission, the chassis control systems (Steering and Suspension Systems and Braking Systems), the electrical system, heating, ventilation and air conditioning and the electronic engine management system. In order to ensure equity for all of the students in our department, students should be given multiple attempts to complete quizzes or shop work in an attempt to maximize the potential of each student. Students will be evaluated according to the accuracy and completeness of their responses in conformity to industry standards after all of the allowed attempts are completed.

Method

Papers

Integration

Students will prepare a one-to-two page paper and/or make an oral presentation discussing the contributions that women have made to automotive technology from its inception. This would include contributions made directly to the engineering aspects of the technology, or it would also include the popularization of automotive technology. A good example of this would be Bertha Benz, who completed the first cross-country automobile journey in 1886. Evaluation will be made according to the relevance of the contribution and the historical accuracy of the narrative.

Method

Simulation

Integration

Students will be evaluated on their ability to perform basic inspection and diagnostic procedures required to evaluate the condition of the components that compose the eight basic areas of modern automotive technology.

Method

Class Work

Integration

Students will be asked to exhibit the ability to safely operate an automotive lift and use floor jacks and jack stands to raise and support a vehicle. Student performance will be evaluated according to their conformity to industry accepted safety practices and their ability to perform the task in the prescribed period of time.

Method

Final Performance

Integration

Students will be required to perform a standard multi-point inspection on a bugged vehicle. Student performance will be evaluated according to their ability to make accurate assessments within the amount of time allotted for this task in industry standard service information.

Assignments

Assignment Type

Reading



In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Read the textbook chapters titled, "Design, Construction, and Application of Engine Components" and, "Engine Classification, Parts Identification" that cover both theory of operation and the components of the two main types of four-cycle internal combustion engines, which are the spark-ignition type and the compression-ignition type. Please be prepared to compare and contrast the operation of both and be prepared to describe the advantages and disadvantages of each of these two types of internal combustion engines.

Assignment Type

Writing

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Prepare a repair or work order according to the standards prescribed by the State of California's Bureau of Automotive Repairs. The repair or work order should include information about a prospective customer and relevant information about that customer's vehicle. The work described must conform to the "Three Cs" standard commonly used in the industry; it must describe the Customer Complaint, the Cause of the Complaint, and the Correction for the Complaint. Remember that this is a legal document and that it needs to be precisely prepared so that it includes the customer signature and date.

Assignment Type

Other

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

Perform a standard multi-point vehicle inspection using a form provided by one of the Automotive Department's industry partners. Keep in mind that the inspection needs to be completed within the amount of time allotted, which varies according to the number of personnel involved in its preparation. Since this assignment will involve the evaluation of each of the eight basic vehicle subsystems, a good working knowledge of each of them will be required for successful completion of this task.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative



Assignment

Prepare a one to two page paper describing the importance of the contributions that women have made to automotive technology. This would include contributions made directly to the engineering aspects of automotive technology, such as Suzanne Vanderbilt, who led an all-female design team at General Motors during the 1950s to women who popularized the technology, such as Clärenore Stinnes, who was the first woman to take the risk of circumnavigating the globe by car in 1929.

Course Materials

Textbooks

Johanson, Chris (2024) Auto Fundamentals, 13th Edition, Goodheart and Willcox. ISBN: 978-1-68584-410-3

Other Resources

ALLDATA Online Service and Repair Information
Mitchell Pro-Demand Online Service and 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.

One of the Automotive Department's primary goals has been to increase the number of women who feel comfortable in participating in our industry; that is our program's, and our industry's most serious shortcoming concerning diversity, equity and inclusion. This course will showcase the contributions that women have made to the advance of automotive technology from its inception. For example, Mary Anderson was awarded a patent for her work in designing the first windshield wiper system in 1903; the device has made driving much safer, and easier, for all of the years that followed and doubtless saved countless lives as well.

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

Automotive Technology is an applied science, and, as such, can be presented to students in a number of different ways. We mentioned above that we have been privileged to provide instruction to students with hearing disabilities; in addition to providing

them with facilitators who present concepts in sign language, we use specialized diagnostic equipment that allows sounds to be "seen" as well as heard, so those students are as able to participate in the course activities as any of the others. A number of students have some physical challenges that might prevent them from applying enough bodily force to perform a specific task in the usual way; in response, the Department has invested in a number of specialized automotive trainer units that allow much of the work to be performed on a trainer board in a controlled environment. This is intended to allow each student, regardless of physical ability, to share in the course experience equitably.

Interactions

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

The Automotive Department organizes the lab sessions for this course by having the students enrolled in the course work in teams of 4 or five students while performing the assigned lab tasks. The lab work' progress is organized according to the performance of different aspects of the task at hand. In this course for example, one member of the team would be assigned to the preparation of the paperwork necessary to document the performance of a tire rotation and tire pressure monitor relearn, while another would be expected to research the online service information necessary to perform the relearn, as the procedure varies from one vehicle to another. The other two would be responsible for safely lifting and supporting the vehicle, actually changing the tire positions and physically performing the relearn. The duties required from each student will rotate from one task to another throughout the course of the semester so that all of them get some exposure to every facet of each of the tasks. Since all of the students will be dependent on one another in order to perform the tasks necessary for success in the class, adequate student-to-student interaction is a necessary for success in this course.

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

The instructor of this course is assigned a number of different responsibilities. First, the instructor generally demonstrates the performance of the expected tasks to the students in either the classroom or in the lab setting, or both. As a part of this course, for example, the instructor will need to demonstrate the proper procedure used to perform a wheel alignment inspection. When the students are asked to perform the alignment check themselves, the instructor will need to be present to supervise them in order to assure that the work is being performed in a safe and professional manner; the instructor is also present to act as a coach to suggest ways in which the job might be better performed, as the procedures used to perform this task vary widely from one vehicle design to another.

Because such close contact is required in order to do this, more than adequate instructor-to-student interaction will necessarily result from these activities.

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

The students enrolled in this course will need to apply the principles that they learn during the lecture periods to their lab work directly afterwards; nearly every theoretical concept associated with this course has a lab exercise connected to it so that the students will have to apply what they have learned directly. This often involves making a diagnosis or a repair on a vehicle or trainer which is bugged in a specific way; either the students will be able to solve the problem at hand themselves, immediately, or seek further guidance and direction from the course instructor. In either case, an adequate amount of student-to-content interaction will be necessary for success in the course.

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

Automotive Technology presents the student with a number of tasks that encourage the student to exercise critical thinking skills. This not only includes making an accurate diagnosis of a specific problem or an inspection of the function of a component or system, but also requires that the student be mindful of ways in which they might have performed the task at hand more efficiently or with a greater level of accuracy or proficiency. This is the skill that differentiates the successful automotive technician from one who simply does not make the grade; since, presumably, the student wishes to be successful, the student will need to incorporate student-to-content interaction into the coursework.