

AUTO 014A: AUTOMOTIVE ENGINE MANAGEMENT

Originator

dredman

Co-Contributor(s)**Name(s)**

Anderson, Dorothy

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

014A

Full Course Title

Automotive Engine Management

Short Title

AUTO ENGINE MGMT

Discipline**Disciplines List**

Automotive Technology

Modality

Face-to-Face

Hybrid

Catalog Description

This course provides theory and hands-on experience in the fundamentals of automotive engine management including: basic fuel injection, ignition systems and emission systems. The focus is then placed on foundational engine management components and systems including fuel injection, electronic ignition and emission control systems with an emphasis on servicing, troubleshooting, diagnosis and repair of common engine management 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 engine management 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

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

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

Formatting Style

APA

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

24

Entrance Skills

Research applicable vehicle and service information, such as engine management system operation, vehicle service history service precautions, and technical service bulletins. Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).

Requisite Course Objectives

AUTO 010-Locate applicable vehicle service specifications and procedures using the latest online service information.
AUTO 010-Properly complete a repair order including all pertinent information and compliant, cause and correction.

Entrance Skills

Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.

Requisite 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.
AUTO 010-Describe the 5-step troubleshooting process.
AUTO 010-Properly connect a digital multimeter and read volts, amps and ohms on a basic electrical circuit.

Entrance Skills

Replace fuel filters. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. Inspect and test fuel injectors.

Requisite 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-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.

Entrance Skills

Verify engine operating temperature; determine necessary action. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.

Requisite 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-Perform a detailed vehicle inspection.

AUTO 010-Maintain a clean working environment.

AUTO 010-Test drive a vehicle to verify the concern and the repair.

Course Content

1. SP2 safety.
2. Engine management overview.
3. Basic theory.
4. Electronic fuel injection systems.
5. Electronic ignition systems.
6. Input sensors.
7. Computer outputs.
8. OBDII computer systems.
9. Emission controls.
10. Automotive industry web-based training modules.

Lab Content

1. Required tasks to meet the Automotive Service Excellence (ASE) 2017 Master Automotive Service Technician (MAST) standards in engine performance.
2. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
3. Identify and interpret engine performance concern; determine necessary action.
4. Research applicable vehicle and service information, such as engine management 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. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
7. Diagnose abnormal engine noise or vibration concerns; determine necessary action.
8. Diagnose abnormal exhaust color, odor, and sound; determine necessary action.
9. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
10. Perform cylinder power balance test; determine necessary action.
11. Perform cylinder cranking compression tests; determine necessary action.
12. Perform engine running compression test; determine necessary action.
13. Perform cylinder leakage test; determine necessary action.
14. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.
15. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.
16. Verify engine operating temperature; determine necessary action.
17. Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
18. Verify correct camshaft timing.
19. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with electronic ignition (distributorless) systems; determine necessary action.
20. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action.
21. Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.
22. Inspect, test and service distributor.
23. Inspect and test ignition system secondary circuit wiring and components; perform necessary action.
24. Inspect and test ignition coil(s); perform necessary action.

25. Check and adjust ignition system timing and timing advance/retard (where applicable).
26. Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action.
27. Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action.
28. Check fuel for contaminants and quality; determine necessary action.
29. Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.
30. Replace fuel filters.
31. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
32. Inspect and test fuel injectors.
33. Check idle speed.
34. Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.
35. Perform exhaust system back-pressure test; determine necessary action.
36. Test the operation of turbocharger/supercharger systems; 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 per California state regulations.
Objective 2	Learners will demonstrate engine diagnosis by applying manufacturer provided repair information while diagnosing engine mechanical, engine management systems faults and computer input and output sensor faults.
Objective 3	Learners will characterize relationships between fuel, ignition, air induction, exhaust and emissions system to interpret unique faults pertaining to each individual system. Once the student has distinguished which system is at fault, sequence applicable diagnostic repair procedures.
Objective 4	Successfully complete SP2 safety training.

Student Learning Outcomes

Upon satisfactory completion of this course, students will be able to:	
Outcome 1	Apply knowledge and skills to repair basic engine management systems given the appropriate service information and repair tools.
Outcome 2	Demonstrate proficiency in referencing service information and documenting repairs, while practicing shop safety and teamwork, when servicing and repairing engine management concerns.
Outcome 3	Practice proper inspection, diagnostic, repair, and maintenance skills given an engine management concern, using the proper diagnostic and repair tools, in a team setting.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Learners will work in a team setting while performing lab activities and may participate in role-play activities.
Demonstration, Repetition/Practice	Learners will perform assigned lab activities.
Collaborative/Team	Learners will work in a team setting while performing lab activities.
Technology-based instruction	Diagnostic test equipment, computer-based tools, and virtual reality scenarios.
Participation	Learners will participate in, but not limited to, classroom activities, research activities, role-play, interactive testing.
Observation	Learners are observed in lab based activities, group activities, research assignments, to complete the required Automotive Service Excellence (ASE) master standards job sheets.
Lecture	Each class is half lecture covering multiple aspects of course content.
Laboratory	Learners will participate in lab based activities to complete their Automotive Service Excellence (ASE) master standards job sheets.

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	Learners may be required to create a research assignment.	In and Out of Class
Student participation/contribution	Turned in by report, written, presentation, however, the learners are required to research information pertaining to the assignment.	In and Out of Class
Mid-term and final evaluations	Demonstrate proficiency in course material by passing the mid-term and final evaluations. Examples of these are not limited to quizzes, exams, presentations, research, or projects.	In and Out of Class
Presentations/student demonstration observations	Learners may be required to create a visual presentation.	Out of Class Only
Laboratory projects	Learners will analyze and complete lab activities.	In Class Only
Written homework	Learners will analyze 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

Lecture notes

1. Quizzes.
2. Classroom discussion participation with real life diagnostic scenarios.
3. Hands on activities.

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. 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, each taking roughly 3 hours,
11. Exam prep 12 hours.

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

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

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

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?

Yes

Additional Fee Amount

\$20.00

Additional Fees Description

Automotive Service Excellent (ASE) Student Exam.

Approvals**Curriculum Committee Approval Date**

3/17/2022

Academic Senate Approval Date

3/24/2022

Board of Trustees Approval Date

4/17/2022

Chancellor's Office Approval Date

5/06/2022

Course Control Number

CCC000631393

Programs referencing this courseAutomotive Air Conditioning Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=104>)Automotive Engine Management Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=107>)Automotive Braking Systems Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=109>)Automotive General Service Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=110>)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>)Automotive Introductions Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined/?key=201>)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>)