

AUTO 014B: ADVANCED ENGINE MANAGEMENT

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 regarding 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

014B

Full Course Title

Advanced Engine Management

Short Title

ADV ENGINE MGMT

Discipline**Disciplines List**

Automotive Technology

Modality

Face-to-Face

Hybrid

Catalog Description

This course provides theory and hands-on experience in intermediate to advanced engine management systems including fuel injection, electronic ignition, emission controls, OBDII, as well as service and maintenance, diagnosis and repair of engine management malfunctions. The focus is then placed on advanced engine management components and systems including: computer inputs, outputs and control and OBDII logic with an emphasis on troubleshooting, diagnosis and repair of advanced engine management 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 engine management system malfunctions. Prerequisite: AUTO 014A

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 014A

Required Text and Other Instructional Materials**Resource Type**

Book

Open Educational Resource

No

Author

Robert Bosch GmbH (editor)

Title

Bosch Automotive Electrics and Automotive Electronics

Edition

5th

City

Plochingen, Germany

Publisher

Springer Vieweg

Year

2014

College Level

Yes

Flesch-Kincaid Level

12

ISBN #

978-3658017835

For Text greater than five years old, list rationale:

This text is the definitive source for automotive electronics.

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 014A-Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

Entrance Skills

Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins

Requisite Course Objectives

AUTO 014A-Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.

Entrance Skills

Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action

Requisite Course Objectives

AUTO 014A-Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and/or engine diagnostic equipment; determine necessary action.

Entrance Skills

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 014A-Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.

Entrance Skills

Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.

Requisite Course Objectives

AUTO 014A-Inspect and test ignition primary circuit wiring and solid state components; perform necessary action.

Course Content

1. SP2 safety.
2. Review of AUTO-014A materials.
3. Diagnostic scan tools and Digital Storage Oscilloscope.
4. Computer input and output sensors.
5. Fuel systems input and output sensors.
6. Ignition system input and output sensors.
7. OBDII diagnosis.
8. Exhaust gas analyzer diagnosis.
9. Automotive industry web-based training modules.

Lab Content

1. Safety & environmental protection.
2. Lab practice with diagnostic scan tools and Digital Storage Oscilloscope.
3. Identify and test various computer input and output sensors.
4. Identify and test various fuel systems input and output sensors.
5. Identify and test various ignition system input and output sensors.
6. Diagnose and repair vehicles with an OBDII concern.

7. Diagnose driveability concerns using the exhaust gas analyzer.
8. Required tasks to meet automotive service excellence (ASE) 2017 master automotive service technician (MAST) standards.

Course Objectives

Objectives	Objectives
Objective 1	Diagnose oil leaks, emissions, and drivability problems resulting from malfunctions in the positive crankcase ventilation (PCV) system; determine necessary action.
Objective 2	Inspect, test and service emission control systems, including the EVAP system.
Objective 3	Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.
Objective 4	Deduce the causes of emissions or drivability concerns resulting from malfunctions in the computerized engine control system with stored diagnostic trouble codes.
Objective 5	Diagnose emissions or drivability concerns resulting from malfunctions in the computerized engine control system with no stored diagnostic trouble codes; determine necessary action.
Objective 6	Evaluate module communication (including CAN/BUS systems) errors using a scan tool and interpret data.
Objective 7	Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action.
Objective 8	Access and use service information to perform 5 step diagnosis procedure.
Objective 9	Diagnose drivability and emissions problems resulting from malfunctions of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, or similar systems); determine necessary action.
Objective 10	Interpret evaporative emission related diagnostic trouble codes (DTCs); determine necessary action.
Objective 11	Perform mechanical engine services including adjust valves on engines with mechanical or hydraulic lifters, Remove and replace timing belt; verify correct camshaft timing, mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
Objective 12	Identify hybrid vehicle internal combustion engine service precautions.
Objective 13	Describe operation and function of sensors related to autonomous vehicles.
Objective 14	Complete SP2 safety training.

Student Learning Outcomes

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

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Demonstration, Repetition/Practice	Learners will complete assigned assignments demonstrating their ability to perform the task.
Technology-based instruction	Diagnostic test equipment, computer-based tools, and virtual reality scenarios.
Participation	Chapter reading and homework.
Observation	Instructor observation during assigned tasks.
Lecture	Instructor lead instruction.
Laboratory	Instructor lead lab activities.
Discussion	Weekly discussions.

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 presentation or other research based assignment.	Out of Class Only
Oral and practical examination	Book report, verbal presentation or other research based assignment.	In and Out of Class
Student participation/contribution	Weekly chapter homework.	In and Out of Class
Mid-term and final evaluations	Analyze course material for exams.	In and Out of Class
Tests/Quizzes/Examinations	Analyze course material for quizzes.	In and Out of Class
Group activity participation/observation	Evaluation of team collaboration when completing lab activities.	In and Out of Class
Presentations/student demonstration observations	Book report, verbal presentation or other research based assignment.	In and Out of Class
Laboratory projects	Lab assignments and tasks.	In and Out of Class
Written homework	Chapter homework.	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. Complete SP2 safety tests.
3. Notes on lecture.
4. Participation in discussion related to topic of lecture.
5. Review and discuss vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
6. Vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
7. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.
8. Must develop teamwork skills through classroom interaction and discussion.

Other Out-of-class Assignments

1. Readings from required text: 1-3 chapters per week from both classroom and shop manuals. (1hr per week)
2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week. (1hr per week)
3. Completion of SP2 safety tests. (4hrs total)
4. Assigned readings and written summaries from selected instructor handouts. (8hrs total)
5. Written summaries and analysis of assigned websites. (5hrs total)
6. Must complete a course project consisting an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork. (8hrs total)
7. Automotive industry web-based training. (8hrs total)

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?

The lab content is comprised of the required tasks to meet the Automotive Service Excellence (ASE) 2017 Master Automotive Service Technician (MAST) standards.

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
- 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:

Orientation, study, and/or review 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

Files Uploaded

Attach relevant documents (example: Advisory Committee or Department Minutes)

AUTO-014B_2019.pdf

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

5/04/2022

Course Control Number

CCC000599871

Programs referencing this course

Automotive 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 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>)