AUTO 014A: AUTOMOTIVE ENGINE MANAGEMENT

Originator
doanderson

Justification / Rationale
Addition to text book

Effective Term
Fall 2020

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

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
Advisory: RDG 061, ENG 061

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
Advisory: RDG 061, ENG 061

Required Text and Other Instructional Materials

Resource Type
Book

Author
Chris Johanson

Title
Modern Automotive Technology NATEF Standards Job Sheets for Performance-Based Learning

Edition
9th

Publisher
G-W

Year
2015

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
9781631263781

Resource Type
Book

Author
Johanson,

Title
Auto Engine Performance and Driveability (work book)

Edition
4th

City
Tinley Park

Publisher
Goodheart-Wilcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
11.5

ISBN #
9781619607835

Resource Type
Book

Author
Johanson, J.

Title
Auto Engine Performance and Driveability

Edition
4TH

City
Tinley Park

Publisher
Goodheart-Wilcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
11.5

ISBN #
9781619607798

Resource Type
Web/Other

Description
1. Safety glasses meeting ANSI Z87.1
2. Three ring binder

Resource Type
Web/Other

Year
2021

Description
The current book is available in digital format and this is going to be offered to the students
2 Year Individual Access Key Code – 978-1-64564-558-0

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.

Entrance Skills

ADVISORY SKILLS:
Use various reading strategies to prepare, read and comprehend expository text

Requisite Course Objectives

RDG 061-Use SQ3R /or SOAR along with outlining, note-taking, mapping summarizing and other strategies to prepare, read, comprehend expository text.

Entrance Skills

Read a variety of texts fluently

Requisite Course Objectives

RDG 061-Read a variety of texts fluently.

Entrance Skills
Write organized summaries reactions that capture main idea and supporting details.

Requisite Course Objectives
RDG 061-Write organized summaries reactions that capture main idea and supporting details.

Entrance Skills
Understand multiple word meanings, uses synonyms

Requisite Course Objectives
RDG 061-Understand multiple word meanings, uses synonyms

Course Content

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

Lab Content

1. Required tasks to meet National Automotive Technicians Education Foundation (NATEF) 2017 Master Automotive Service Technician (MAST) standards.
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.
Objective 2	General: Engine Diagnosis
Objective 3	Computerized Controls Diagnosis and Repair
Objective 4	Ignition System Diagnosis and Repair
Objective 5	Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair
Objective 6	Emissions Control Systems Diagnosis and Repair
Objective 7	Shop and Personal Safety
Objective 8	Tools and Equipment
Objective 9	Preparing Vehicle for Service
Objective 10	Preparing Vehicle for Customer

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	The student will be able to repair basic engine management systems using the appropriate service information and diagnostic tools.
Outcome 2	The student will be able to troubleshoot basic engine management systems using the appropriate service information and diagnostic tools.
Outcome 3	The student will be able to diagnose basic engine management systems using the appropriate service information and diagnostic tools.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Student will work in a team setting while performing lab activities and student may participate in role play activities.
Demonstration, Repetition/Practice	Students will perform assigned lab activities.
Collaborative/Team	Student will work in a team setting while performing lab activities.
Technology-based instruction	Diagnostic equipment based activities.
Participation	Student will participate in, but not limited to, classroom activities, research activities, role-play, interactive testing.
Observation	Student are observed in lab based activities, group activities, research assignments, to complete National Automotive Technicians Education Foundation (NATEF) standards job sheets
Lecture	Each class is half lecture covering multiple aspects of course content.

Laboratory	Student will participate in lab based activities to complete their National Automotive Technicians Education Foundation (NATEF) 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	Students may be required to complete a research assignment.	Out of Class Only
Self-paced testing	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. Students may be required to complete a research assignment.	Out of Class Only
Student participation/contribution	Turned in by report, written, presentation, however, the student is required to research information pertaining to the assignment.	Out of Class Only
Mid-term and final evaluations	Used to evaluate students' knowledge and understanding of the information presented. Examples of these are not limited to quizzes, exams, presentations, research, or projects.	In and Out of Class
Reading reports	Turned in by report, written, presentation, however the student is required to research information pertaining to the assignment.	Out of Class Only
Presentations/student demonstration observations	Student may participate in role play activities and be required to do a visual presentation.	Out of Class Only
Laboratory projects	Lab activities and student may participate in role play activities.	In Class Only
Written homework	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. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities. The notebook must be organized by chapter, in-class notes, handouts and extra-credit assignments. The notebook will be evaluated after the half way point and graded at the end of the course.
8. Vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.

9. Hands-on lab worksheets matching each course objective. These will be graded by the instructor throughout the semester during lab time.
10. Must develop teamwork skills through lab activities and assigned special projects.
11. Chrysler web-based training modules, each taking roughly 3 hours
12. Exam prep 12 hours

Grade Methods
Letter Grade Only

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
Not transferable

General Education Status
Not applicable

Support Course Status
Course is not a support course

Allow Audit
No

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
3/03/2020

Academic Senate Approval Date
3/12/2020

Board of Trustees Approval Date
5/15/2020

Course Control Number
CCC000455021

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 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/)