AUTO 015: AUTOMOTIVE ENGINE DIAGNOSIS & REPAIR

Originator
doanderson

Justification / Rationale
Addition to text book

Effective Term
Fall 2020

Credit Status
Credit - Degree Applicable

Subject
AUTO - Automotive Technology

Course Number
015

Full Course Title
Automotive Engine Diagnosis & Repair

Short Title
ENGINE DIAG & REPAIR

Discipline

Disciplines List
Automotive Technology

Modality
Face-to-Face

Catalog Description
This course provides theory and hands-on experience in automotive engine mechanical systems including: theory of operation, service, diagnosis and repair including the following topics: valve train components and procedures, engine block components and procedures, disassembly and reassembly skills and engine mechanical troubleshooting tests. 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 engine mechanical systems. 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
2.5

Lecture Semester Hours
45

Lab Units
1.5

Lab Semester Hours
81

In-class Hours
126

Out-of-class Hours
90

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
2017

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
9781631263781

Resource Type
Book

Author
Duffy, James

Title
Auto Engine Repair Workbook

Edition
6th

Publisher
Goodheart-Willcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
9781619606708

Resource Type
Book

Author
Duffy, James

Title
Auto Engine Repair

Edition
6th

Publisher
Goodheart-Willcox

Year
2015

College Level
Yes

Flesch-Kincaid Level
13

ISBN #
9781619606678

Resource Type
Web/Other

Description
1. Safety glasses meeting ANSI Z87.1

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
Describe shop safety practices.

Requisite Course Objectives
AUTO 010-Describe shop safety practices and proper procedures regarding handling hazardous material.

Entrance Skills
Identify basic automotive tools and equipment.

Requisite Course Objectives
AUTO 010-Identify basic automotive tools and equipment.

Entrance Skills
Locate applicable vehicle service specifications and procedures using the latest online service information

Requisite Course Objectives
AUTO 010-Locate applicable vehicle service specifications and procedures using the latest online service information.

Entrance Skills
Properly complete a repair order including all pertinent information and compliant, cause and correction.

Requisite Course Objectives
AUTO 010-Properly complete a repair order including all pertinent information and compliant, cause and correction.

Entrance Skills
Properly position and lift a vehicle using a floor jack and jack stands and a vehicle hoist.

Requisite Course Objectives
AUTO 010-Properly position and lift a vehicle using a floor jack and jack stands and a vehicle hoist.

Entrance Skills
Locate and interpret key vehicle identification information

Requisite Course Objectives
AUTO 010-Locate and interpret key vehicle identification information.

Entrance Skills
Work together in a team setting.

Requisite Course Objectives
AUTO 010-Display team work.

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

ENG 061-Use theses to organize paragraphs into coherent analyses.
RDG 061-Write organized summaries reactions that capture main idea and supporting details.

Entrance Skills

Understand multiple word meanings, uses synonyms

Requisite Course Objectives

ENG 061-Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.
RDG 061-Understand multiple word meanings, uses synonyms

Course Content

1. Theory of engine operation
2. Engine materials and components
3. Cylinder heads
4. Camshafts and valve trains
5. Engine timing
6. Cylinder block and components
7. Engine repair skills
8. Engine service
9. Engine diagnosis, troubleshooting and repair
10. Chrysler web-based training modules

Lab Content

1. Safety & environmental protection
2. Identify engine materials and components
3. Diagnose and repair cylinder head concerns
4. Diagnose and repair camshafts and valve train concerns
5. Set engine timing
6. Diagnose and repair cylinder block and component concerns
7. Perform basic engine services
8. Required tasks to meet NATEF 2017 MAST standards

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	Identify and interpret engine concern; determine necessary action.
Objective 3	Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.
Objective 4	Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).
Objective 5	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
Objective 6	Diagnose engine noises and vibrations; determine necessary action.
Objective 7	Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action.
Objective 8	Perform engine vacuum tests; determine necessary action.
Objective 9	Perform cylinder power balance tests; determine necessary action.
Objective 10	Perform cylinder cranking compression tests; determine necessary action.
Objective 11	Perform cylinder leakage tests; determine necessary action.

Objective 12	Remove and reinstall engine in a front-wheel or rear wheel drive vehicle (OBDII or newer); reconnect all attaching components and restore the vehicle to running condition.
Objective 13	Install engine covers using gaskets, seals and sealers as required.
Objective 14	Remove and reinstall cylinder heads and gaskets; tighten according to manufacturer's specifications and procedures.
Objective 15	Visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition.
Objective 16	Inspect valve springs for squareness and free height comparison; determine necessary action.
Objective 17	Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.
Objective 18	Inspect valves and valve seats; determine necessary action.
Objective 19	Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
Objective 20	Inspect hydraulic or mechanical lifters; determine necessary action.
Objective 21	Adjust valves (mechanical or hydraulic lifters).
Objective 22	Inspect camshaft drives (including gear wear and backlash, sprocket and chain wear); determine necessary action.
Objective 23	Inspect and replace timing belts (chains), overhead camdrive sprockets, and tensioners; check belt/chain tension; adjust as necessary.
Objective 24	Inspect camshaft for runout, journal wear and lobe wear.
Objective 25	Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.
Objective 26	Establish camshaft(s) timing and cam sensor indexing according to manufacturer's specifications and procedures.
Objective 27	Disassemble engine block; clean and prepare components for inspection and reassembly.
Objective 28	Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.
Objective 29	Perform common fastener and thread repair to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
Objective 30	Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.
Objective 31	Deglaze and clean cylinder walls.
Objective 32	Inspect crankshaft for end play, straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure journal wear; check crankshaft sensor reluctor ring (where applicable); determine necessary action.
Objective 33	Inspect and measure pistons; determine necessary action.
Objective 34	Remove and replace piston pin.
Objective 35	Inspect, measure, and install piston rings.
Objective 36	Inspect or replace crankshaft vibration damper (harmonic balancer).
Objective 37	Assemble engine block assembly.
Objective 38	Perform oil pressure tests; determine necessary action.
Objective 39	Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.
Objective 40	Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; determine necessary action.
Objective 41	Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
Objective 42	Inspect and replace engine cooling and heater system hoses.
Objective 43	Inspect, test, and replace thermostat and gasket.
Objective 44	Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
Objective 45	Inspect, test, remove, and replace water pump.
Objective 46	Remove and replace radiator.
Objective 47	Inspect, and test fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
Objective 48	Inspect auxiliary oil coolers; determine necessary action.
Objective 49	Inspect, test, and replace oil temperature and pressure switches and sensors.
Objective 50	Perform oil and filter change.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Demonstrate shop safety practices while working in a team setting.
Outcome 2	Diagnose and repair intermediate to advanced level internal engine malfunctions and concerns.
Outcome 3	Demonstrate proficiency in referencing service information in order to inspect and perform maintenance on engine systems, and documenting repairs.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Student may participate in role play activities
Technology-based instruction	Classroom and lab activities require critical thinking and diagnosis
Demonstration, Repetition/Practice	Lab activities and student may participate in role play activities
Collaborative/Team	Student will work in a team setting while performing lab activities
Participation	Student will work in a team setting while performing lab activities
Observation	Student will be observed activities in lab, group activities, information research, collaborative assignments, and other activities assigned.
Lecture	Each class is half lecture covering multiple aspects of course content
Laboratory	Student will participate in lab based activities to complete their 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 paper	Out of Class Only
Student participation/contribution	Lab activities and student may participate in role play activities	In and Out of Class
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
Product/project development evaluation	Student may participate in role play activities and be required to do a visual presentation	In and Out of Class
Group activity participation/observation	Student may participate in role play activities	In and Out of Class
Presentations/student demonstration observations	Student may participate in role play activities and be required to do a visual presentation	In and Out of Class
Laboratory projects	Student will participate in lab based activities to complete their NATEF standards job sheets	In Class Only
Term or research papers	Students may be required to complete a research paper	Out of Class Only
Reading reports	Turned in by report, written, presentation, however, the student is required to research information pertaining to the assignment	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. Begin 3 SP2 safety tests.
3. Notes on lecture.
4. Participation in discussion related to topic of lecture.
5. 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.

6. Review and discuss vehicle diagnosis, troubleshooting and repair of personal, shop and other vehicles to be evaluated by the instructor during lab time.
7. 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. 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 3 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.
5. Written summaries and analysis of assigned websites.
6. Must complete a course project consisting of an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork. 5 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. Notebooks 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
CCC000455023

Programs referencing this course
Automotive Air Conditioning Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined?key=104/)
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/)