AUTO 040E: CNG DIAGNOSIS & REPAIR

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

040E

Full Course Title

CNG Diagnosis & Repair

Short Title

CNG DIAG & REPAIR

Discipline

Disciplines List
Automotive Technology

Modality

Face-to-Face
Hybrid

Catalog Description

This course provides classroom lecture/discussion and hands-on training on CNG diagnosis and repair. The course is designed to introduce the service technician to safety, diagnostic and repair practices and procedures unique to gaseous fuel vehicles including: ignition, fuel delivery and emissions systems design, operation, diagnosis and service. A uniform is required for this course.

Schedule Description

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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

Required Text and Other Instructional Materials

Resource Type
Web/Other

Description
Handouts provided by the instructor.

Resource Type
Book

Open Educational Resource
No

Title
National Fire Protection Association (NFPA) 52

Publisher
National Fire Protection Association

Year
2019

College Level
Yes

Flesch-Kincaid Level
13

Class Size Maximum
21

Course Content

1. Compressed Natural Gas (CNG) safety precautions & procedures, SP2.
2. Review of gaseous fuels fundamentals.
3. Compressed Natural Gas (CNG) ignition systems component function and location.
4. Compressed Natural Gas (CNG) fuel systems component function and location.
5. Compressed Natural Gas (CNG) emissions systems component function and location.
6. Compressed Natural Gas (CNG) diagnosis with current generation scan tool.
7. Compressed Natural Gas (CNG) repair procedures.

Lab Content

1. Practice CNG safety precautions & procedures.
2. Diagnose, troubleshoot and repair CNG ignition system malfunctions.
3. Diagnose, troubleshoot and repair CNG fuel system malfunctions.

4. Diagnose, troubleshoot and repair CNG emissions system malfunctions.
5. Diagnose, troubleshoot and repair CNG systems using current generation scan tool.

Course Objectives

	Objectives
Objective 1	Interpret and verify complaints; determine needed repairs.
Objective 2	Diagnose and repair no starting, hard starting, engine misfire, poor driveability, power loss, poor mileage, and emissions problems on vehicle's Original Equipment Manufacturers (OEM) and supplemental sensors (e.g., manifold skin temperature, intake air temperature, etc.).
Objective 3	Diagnose and repair intermittent or complete failure of electric, electronic or mechanical devices (e.g., hour meters, fuel level indicators, fuel selection devices).
Objective 4	Check all fuel system components to include fuel lock-off, valves, solenoids, manual shutoff, connections, fittings, hoses and tubing for leaks, wear, installation and proper operation; repair or replace as needed.
Objective 5	Diagnose the cause of abnormal fuel flow through fuel carrying components.
Objective 6	Diagnose the cause of fuel odor or fuel loss by inspecting or testing the fuel supply system components such as valves, fuel supply container, pressure relief device (PRD), tubing and hoses; repair or replace as needed.
Objective 7	Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, and lean or rich mixture problems on vehicles with fumigation or injection type fuel systems; determine needed repairs.
Objective 8	Inspect and test vacuum and electrical components and connections of fuel system; repair or replace as needed.
Objective 9	Comply with shop and vehicle safety practices relevant to electric, hybrid and fuel cell vehicles.
Objective 10	Perform diagnostic procedures on vehicles with on-board computer/electronic fuel system support.
Objective 11	Follow manufacturer's maintenance schedule to ensure fluids and lubricants are at proper levels and serviced with recommended products.
Objective 12	Identify the process of recertification or replacement of fuel supply container(s) according to most current regulations (e.g., Natural Gas Vehicle Standard 2 [NGV-2], Department of Transportation [DOT]); complete documentation; remove and replace fuel supply container, if required.
Objective 13	Inspect fuel supply container(s) and brackets as it relates to certification: data plate, working pressures, fuel supply container damage, valves, bolts, torque specifications, and all sealing and venting equipment.
Objective 14	Inspect air filters and fuel filter; service or replace as needed.
Objective 15	Inspect, adjust, and test manual shut-off valve, service valve, check-valves, and solenoid valves; repair or replace as needed.
Objective 16	Empty fuel supply container according to manufacturer's procedures and all local, state and federal regulations. (Local procedures will vary and extreme care must be exercised if using actual fuel. Use of inert gas is recommended for this task.)
Objective 17	Inspect and test fuel selection system components; repair or replace as needed.
Objective 18	Select and install swage, compression, flare, captive O-ring, National Pipe Thread (NPT), and other fittings using manufacturer's recommended sealants when required.
Objective 19	Interpret and verify complaint; determine needed repairs.
Objective 20	Inspect and test fuel pressure regulation system components; adjust, repair or replace as needed.
Objective 21	Perform safe fueling procedures and determine fuel level.
Objective 22	Identify working pressures and demonstrate an understanding of fuel characteristics as they relate to temperature and fill procedures.
Objective 23	Successfully complete SP2 safety training.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Demonstrate proficiency in referencing service information and documenting repairs, while practicing shop safety and teamwork when servicing and repairing gaseous vehicle concerns.
Outcome 2	Prepare a study guide to be used to help successfully pass the Automotive Service Excellence (ASE) F1 and H1 exams.
Outcome 3	Demonstrate the ability to perform repair practices and procedures unique to gaseous fuel vehicles.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Collaborative/Team	Work in a team setting while performing NATEF tasks, researching information and group based activities.
Technology-based instruction	Diagnostic test equipment, computer-based tools, and virtual reality scenarios.
Observation	Perform 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.
Discussion	Student will participate in classroom discussions
Demonstration, Repetition/Practice	Demonstrate their ability to correctly perform a given task not limited to laboratory assignments, research projects, interactive role-play and group activities.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
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
Self-paced testing	Participation in role play activities and be required to do a visual presentation.	Out of Class Only
College level or pre-collegiate essays	A research report submitted or completed, not limited to a, written, presentation, however the student is required to research information pertaining to the assignment.	Out of Class Only
Student participation/contribution	Lab activities and role play activities.	Out of Class Only
Mid-term and final evaluations	Used to evaluate learners' 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
Group activity participation/observation	Perform activities in lab, group activities, information research, collaborative assignments, and other activities assigned.	In and Out of Class
Laboratory projects	Participate in lab based activities related to gaseous fuel vehicles.	In Class Only
Reading reports	Turned in by report, written, presentation, research information pertaining to the assignment.	In and Out of Class

Assignments

Other In-class Assignments

1. Lecture notes
2. Problem solving participation and discussion
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.
2. Homework from required text: multiple-choice questions, fill in the blank and essay questions to be graded each week.
3. Completion of 3 SP2 safety tests.
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 an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork.

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.
9. Must develop teamwork skills through lab activities and assigned special projects.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

50

On-campus %

50

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
Weekly announcements

External to Course Management System:

Direct e-mail
Synchronous audio/video

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
47.0614 - Alternative Fuel Vehicle Technology/Technician.

TOP Code
094840 - Alternative Fuels and Advanced Transportation 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

Allow Audit
Yes

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
05/03/2022

Academic Senate Approval Date
05/12/2022

Board of Trustees Approval Date
06/16/2022

Course Control Number

CCC000588761

Programs referencing this course

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 Alternative Fuels Certificate of Achievement (http://catalog.collegeofthedesert.eduundefined/?key=82)