AUTO 040E: CNG DIAGNOSIS & REPAIR

Originator
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Justification / Rationale
Remove material (uniform) fees.

Effective Term
Fall 2019

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

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
2006 Honda Civic GX Service Manual 61SNA06

Resource Type
Web/Other

Description
Handouts provided by the instructor

Resource Type
Web/Other

Description
NFPA 52 Vehicular Fuel Systems Code, 2015 Edition

Class Size Maximum
21

Course Content
1. Compressed Natural Gas (CNG) safety precautions & procedures
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.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	The student should be able to pass Automotive Service Excellence (ASE) Transit Bus Compressed Natural Gas Engines (H1) exam
Outcome 2	The student should be able to Light Vehicle Compressed Natural Gas (F1) certification exam.
Outcome 3	The student should 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	Student will work in a team setting while performing NATEF tasks, researching information and group based activities
Technology-based instruction	Diagnostic equipment based 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
Discussion	Student will participate in classroom discussions
Demonstration, Repetition/Practice	Each student will 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,Student preparation	Student may participate 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 student may participate in role play activities	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
Group activity participation/observation	Student will be observed activities in lab, group activities, information research, collaborative assignments, and other activities assigned.	In and Out of Class
Laboratory projects	Student will participate in lab based activities to complete their NATEF standards job sheets	In 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. 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. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities.
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.
10. Must develop teamwork skills through lab activities and assigned special projects.

Grade Methods

Letter Grade Only

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
Not transferable

Allow Audit
Yes

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
02/21/2019

Academic Senate Approval Date
02/28/2019

Board of Trustees Approval Date
03/15/2019

Course Control Number
CCC000588761

Programs referencing this course
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/)