COLLEGE OF THE DESERT

Course Code AUTO-041B

Course Outline of Record

1. Course Code: AUTO-041B
2. a. Long Course Title: CNG Installation & Repair
   b. Short Course Title: CNG INSTALL & REPAIR
3. a. Catalog Course Description:
   This course is designed to introduce students to CNG installation and basic service and repair. The following topics are covered in this course: gaseous fuel safety, CNG conversion advantages and disadvantages, and service of CNG conversions.
   b. Class Schedule Course Description:
   This class is designed to introduce students to Compressed Natural Gas (CNG) installation and basic service and repair. The following topics are covered in this course: gaseous fuel safety, CNG conversion, advantages and disadvantages, and service of CNG conversions.
   c. Semester Cycle (*if applicable*): Fall
   d. Name of Approved Program(s):
   - ADVANCED TRANSPORTATION TECHNOLOGIES AS Degree for Employment Preparation
4. Total Units: 3.00 Total Semester Hrs: 90.00
   Lecture Units: 2 Semester Lecture Hrs: 36.00
   Lab Units: 1 Semester Lab Hrs: 54.00
   Class Size Maximum: 21 Allow Audit: No
   Repeatability No Repeats Allowed
   Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
   Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)
   Advisory: ENG 070
6. Textbooks, Required Reading or Software: *(List in APA or MLA format.)* *N/A*
7. Entrance Skills: *Before entering the course students must be able:*
   Advisory skills:

   a.
   Properly complete repair orders. Research service information and information from text. Comprehend and follow service and diagnostic procedures.

   - ENG 070 - Comprehend and summarize readings.
   - ENG 070 - Read and identify main ideas and supporting details.
   - ENG 070 - Demonstrate the ability to use writing handbook as reference tool.
   - ENG 070 - Identify and employ prewriting activities.
   - ENG 070 - Demonstrate through the writing process the ability to apply standard rules of grammar, punctuation and spelling in academic writing.
   - ENG 070 - Introduce basic concepts of research and documentation strategies [in-text quote; basic MLA citations—-book, interview].

8. Course Content and Scope:

Lecture:

1. Compressed Natural Gas (CNG) safety precautions & procedures
2. Review of gaseous fuels fundamentals
3. Installation of Compressed Natural Gas (CNG) fuel system
4. Safety and legal regulations related to Compressed Natural Gas (CNG) installation
5. Service procedures unique to a Compressed Natural Gas (CNG) installation
6. Basic diagnositic techniques for Compressed Natural Gas (CNG) fuel systems

Lab: *(if the "Lab Hours" is greater than zero this is required)*

1. Practice CNG safety precautions & procedures
2. Perform basic manintence on CNG fuel system
3. Installation of CNG fuel system
4. Verify proper installation with special attention to safety and legal regulations related to CNG installation
5. Diagnose, troubleshoot and repair CNG installation malfunctions

9. Course Student Learning Outcomes:

1.
Perform basic service operations on Compressed Natural Gas (CNG) vehicles.

2.
Diagnose basic driveability concern on Compressed Natural Gas (CNG) vehicles.

3.
Determine if Compressed Natural Gas (CNG) fule system is properly installed according to Nationl Fire Pretection Agency Standard 52 (NFPA-52), manufacurer documentation and related service information.

4.
Make corrections to Compressed Natural Gas (CNG) fuel system to bring the installation into complience with National Fire Protection Agency Standard 52 (NFPA-52), manufacurer documentation and related service information.

10. Course Objectives: *Upon completion of this course, students will be able to:*

a. Inspect the vehicle for pre-existing conditions that may adversely affect the performance of the vehicle.
b. Install fuel supply container with mounting hardware, valving, shielding, fuel level indicator, and remote fill assembly as needed, using manufacturer’s specifications and required local, state and federal regulations.
c. Install pressure relief device (PRD) and venting system.
d. Select and install flare, National Pipe Thread (NPT), and other fittings using required sealants for Compressed Natural Gas (CNG) according to manufacturer’s specifications.
e. Install gas tight enclosure around valves and fittings, vent to the outside of vehicle as required.
f. Determine routing and protection of fuel line components according to industry standards.
g. Install tubing, piping, hose, and valves using appropriate chafing protection, mounting hardware, and protective shields, according to industry safety standards.
h. Determine appropriate location and mounting of the converter/regulator; install the converter/regulator using mounting brackets, fuel lock, fittings, starting aids, control valves, cooling lines, and thermostat as required and according to manufacturer’s specifications.
i. Install fuel injection/carburetion or other fuel control components according to manufacturer’s instructions.
j. Install electrical/electronic components using Original Equipment Manufacturer (OEM) or manufacturer’s wire connections and wiring diagrams, applying all safety precautions.
k. Determine location of electrical components considering safety, serviceability, function, component protection, and esthetics according to manufacturer’s specifications (when available).
l. Inspect and test each installed component to ensure it is connected and positioned in a safe and effective manner.
m. Purge and pressurize fuel system and check for system integrity through its maximum working pressure (leak test).

n. Perform system setup procedures according to manufacturer's specifications..
o. Complete and affix required safety/information labels.
p. Test vehicle for acceptable driveability and operation (on each fuel for dual fuel vehicles).
q. Inspect and ensure that all required emissions control devices are present and functional; confirm that the vehicle emissions meet applicable local, state, and federal requirements.

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*
    a. Collaborative/Team
    b. Demonstration, Repetition/Practice
    c. Discussion
    d. Laboratory
    e. Lecture
    f. Observation
    g. Participation
    h. Technology-based instruction

    Other Methods:

    Reading assignments

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*
    In Class Hours: 90.00
    Outside Class Hours: 72.00
    a. Out-of-class Assignments
        1. Research using online serive information and OEM information.
        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 of 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.
    b. In-class Assignments
        1. Lecture from handouts and NFPA 52.
        2. Worksheets and quizzes.
        3. Introduction to SP2 safety tests.
        4. Written summaries and analysis of assigned websites.
        5. Must complete a course project consisting an essay describing, analyzing and summarizing a selected topic, including out of class research and fieldwork.
        6. Students must keep a notebook of all course materials including homework, class notes, handouts, class project and team activities.
        7. Diagnostic scenarios discussed and group troubleshooting.
        8. Step-by-step discussion of CNG conversion including state and federal regulations and safety.

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*
    - Written homework
    - Guided/unguided journals

- Reading reports
- Laboratory projects
- Group activity participation/observation
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution
- Oral and practical examination

14. Methods of Evaluating: Additional Assessment Information:

Review of homework Lab activity evaluations Written and hands-on exams

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

PO - Career and Technical Education

Fulfill the requirements for an entry- level position in their field.
Apply critical thinking skills to execute daily duties in their area of employment.
Apply critical thinking skills to research, evaluate, analyze, and synthesize information.
Display the skills and aptitude necessary to pass certification exams in their field.

IO - Personal and Professional Development

Self-evaluate knowledge, skills, and abilities.
Demonstrate an understanding of ethical issues to make sound judgments and decisions.

IO - Scientific Inquiry

Collect and analyze data. Skills of data collection include an understanding of the notion of hypothesis testing and specific methods of inquiry such as experimentation and systematic observation.
Predict outcomes utilizing scientific inquiry: using evidence and assertions determine which conclusions logically follow from a body of quantitative and qualitative data.

IO - Global Citizenship - Ethical Behavior

Integrate universally accepted values such as honesty, responsibility, respect, fairness, courage and compassion into judgments and decision-making.

16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year

17. Special Materials and/or Equipment Required of Students:

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

18. Materials Fees: ☐ Required Material?

Material or Item	Cost Per Unit	Total Cost

19. Provide Reasons for the Substantial Modifications or New Course:

Required due to changes in certification. Not a new course, but a major modification of the existing course.

20. a. Cross-Listed Course *(Enter Course Code)*: *N/A*
    b. Replacement Course *(Enter original Course Code)*: AUTO-041

21. Grading Method *(choose one)*: Letter Grade Only

22. MIS Course Data Elements
    a. Course Control Number [CB00]: *N/A*

b. T.O.P. Code [CB03]: 94840.00 - Alternative Fuels and Adv
c. Credit Status [CB04]: D - Credit - Degree Applicable
d. Course Transfer Status [CB05]: C = Non-Transferable
e. Basic Skills Status [CB08]: 2N = Not basic skills course
f. Vocational Status [CB09]: Clearly Occupational
g. Course Classification [CB11]: Y - Credit Course
h. Special Class Status [CB13]: N - Not Special
i. Course CAN Code [CB14]: *N/A*
j. Course Prior to College Level [CB21]: Y = Not Applicable
k. Course Noncredit Category [CB22]: Y - Not Applicable
l. Funding Agency Category [CB23]: Y = Not Applicable
m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program *(if program-applicable)*: ADVANCED TRANSPORTATION TECHNOLOGIES
Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment
First Year: 21
Third Year: 21

24. Resources - Faculty - Discipline and Other Qualifications:
a. Sufficient Faculty Resources: Yes
b. If No, list number of FTE needed to offer this course: *N/A*

25. Additional Equipment and/or Supplies Needed and Source of Funding.
N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. *(Explain:)*
N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES
Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Douglas Hugh Redman Origination Date