NORTHEAST IOWA COMMUNITY COLLEGE
Calmar/Peosta

1.0 COURSE TITLE: Automotive Metal Repair/Hybrid Vehicles

2.0 COURSE NUMBER: AUT:191

3.0 SEMESTER HOUR CREDIT: 2

4.0 LECTURE HOURS: 24

5.0 LAB HOURS: __16**_____ CLINICAL HOURS: ___**0**____ COOP HOURS: ___**0**_____**

6.0 COURSE DESCRIPTION:

During this course students will learn various metal repair techniques including oxyacetylene welding brazing and cutting, plasma cutting, GMAW welding, and thread repair. The student will also be introduced into electric and alternative powered vehicles theory and operation.

6.1 Pre-/corequisites: AUT:627
6.2 Primary Common Learning Outcome: Critical Thinking
6.3 Bloom's Domain Level: Understand

7.0 MAJOR COURSE OBJECTIVE:

Students will be able to describe metal repair as applied in automotive repair, and the basic operation of electric and alternative fuel powered vehicles.

8.0 EDUCATION (COURSE) LEARNING OUTCOMES (ELOs):

8.1 Students will be able to demonstrate safe welding practices.
8.2 Students will be able to demonstrate the use of an oxyacetylene torch.
8.3 Students will be able to demonstrate proper GMAW (Gas Metal Arc Welding).
8.4 Students will be able to describe the operation of electric vehicles.
8.5 Students will be able to describe electrical operations in hybrid/electric vehicles.
8.6 Students will be able to describe motor and generator operations of hybrid/electric vehicles.
8.7 Students will be able to describe battery operations as applied to hybrid/electric vehicles.

9.0 UNITS:

9.1 Unit One: Students will be able to demonstrate safe welding practices.

Competencies:
At the end of this unit, the student will be able to:
9.1.1 Explain how to set-up welding and cutting equipment safely.
9.1.2 Demonstrate how to operate welding and cutting equipment safely.
9.1.3 Demonstrate how to remove broken fasteners, tap threads, and cut threads.

9.2 Unit Two: Students will be able to demonstrate the use of an oxyacetylene torch.

Competencies:
At the end of this unit, the student will be able to:
9.2.1 Demonstrate gas welding.

9.2.2 Demonstrate brazing.
9.2.3 Demonstrate a cutting task.

9.3 Unit Three: Students will be able to demonstrate proper GMAW (Gas Metal Arc Welding).

Competencies:
At the end of this unit, the student will be able to:
9.3.1 Demonstrate various welds as required in an automotive repair facility.

9.4 Unit Four: Students will be able to describe the operation of electric vehicles.

Competencies:
At the end of this unit, the student will be able to:
9.4.1 Describe the differences between vehicles powered by electricity and those powered by an internal combustion engine.
9.4.2 Describe the basic advantages of using the commonly available alternative fuels in an internal combustion engine.
9.4.3 Describe the basic components of all electric drive vehicles.
9.4.4 Describe regenerative braking.

9.5 Unit Five: Students will be able to describe electrical operations in hybrid/electric vehicles.

Competencies:
At the end of this unit, the student will be able to:
9.5.1 Define the terms normally used to describe electricity.
9.5.2 Describe the differences between AC and DC.
9.5.3 Describe the differences between series and parallel circuits.
9.5.4 Outline the various electrical components and their uses in electrical circuits.

9.6 Unit Six: Students will be able to describe motor and generator operations of hybrid/electric vehicles.

Competencies:
At the end of this unit, the student will be able to:
9.6.1 Describe the operation of all electric motors.
9.6.2 Summarize the importance of magnetic principles of magnetic principles in the operation of a motor and generator.
9.6.3 Compare the operating of a brushless DC motor to a brushed DC motor.
9.6.4 Discuss the characteristics of a three phase AC voltage and describe the operation of a three phase AC motor.
9.6.5 Describe the differences between a motor and generator.
9.6.6 Describe the purpose of a controller in a motor/generator circuit.

9.7 Unit Seven: Students will be able to describe battery operations as applied to hybrid/electric vehicles.

Competencies:
At the end of this unit, the student will be able to:
9.7.1 Describe how a battery works.
9.7.2 Describe the different methods used to recharge a battery.
9.7.3 List the precautions that must be adhered to when working with or around high voltages.

9.7.4 Describe the construction and operation of lead acid battery, nickel metal hydride battery, nickel cadmium battery, lithium ion battery, and lithium ion polymer battery.
9.7.5 Describe the construction and operation of an ultra-capacitor.

10.0 INSTRUCTION (methodologies that enhance student learning):

10.1 Teaching Essentials – Face to face, lecture
10.2 Reflective and Integrative Learning – Pearson LMS and class discussion
10.3 Collaboration Learning – In class discussion
10.4 Active Learning – Lab/vehicle repair
10.5 Technology – Pearson LMS

11.0 GRADING CRITERIA:

11.1 Grades will be assigned for work completed using the letter grades A-F as identified in the college catalog.
11.2 The instructor will provide the grading criteria to students at the beginning of the course.

12/14; Revised 11/18, 1/22, 4/23