AUTO 192 Course Outline as of Spring 2011

CATALOG INFORMATION

Dept and Nbr: AUTO 192 Title: ADV ALT FUELS: EMERGING
Full Title: Advanced Alternative Fuels: EmergingTechnologies
Last Reviewed: 9/27/2010

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	1.50	17.5	Lecture Scheduled	26.25
Minimum	3.00	Lab Scheduled	4.50	6	Lab Scheduled	78.75
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 52.50 Total Student Learning Hours: 157.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	DET 192
Formerly:	

Catalog Description:
History, development, and implementation strategies for ultra low or zero emissions technologies soon to be used in commercial applications, including hydrogen cells, vegetable oil bio-fuel motors, hybrid motors, duel fuel motors, and electric motors. Examines how these technologies will be utilized in cities, farms, power generation facilities, and freight environments. Lab activities involve experimentation with and fabrication of alternative fuel components.

Prerequisites/Corequisites:
Course Completion of DET 190.1 OR Course Completion of AUTO 190.1

Recommended Preparation:
Course Completion of WELD 70 and Course Completion of MACH 51A AND Course Eligibility for ENGL 100 or Course Eligibility for ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: History, development, and implementation strategies for ultra low or zero emissions technologies soon to be used in commercial applications, including hydrogen cells, vegetable oil

bio-fuel motors, hybrid motors, duel fuel motors, and electric motors. Examines how these technologies will be utilized in cities, farms, power generation facilities, and freight environments. Lab activities involve experimentation with and fabrication of alternative fuel components. (Grade Only)
Prerequisites/Corequisites: Course Completion of DET 190.1 OR Course Completion of AUTO 190.1
Recommended: Course Completion of WELD 70 and Course Completion of MACH 51A AND Course Eligibility for ENGL 100 or Course Eligibility for ESL 100
Limits on Enrollment:
Transfer Credit:
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Effective:	Inactive:
UC Transfer:	Effective:	Inactive:

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Outcomes and Objectives:
Upon successful completion of this course the student will be able to:
1. Summarize and discuss the progress and limitations of ultra low emissions technology vs. zero emission technology.
2. Explain the diesel combustion process and why it produces a zero carbon cycle when used with bio-fuels such as vegetable oil.
3. Compare and contrast the energy efficiency of internal combustion engines and hydrogen cells.
4. Differentiate between hydrogen as a fuel for internal combustion motors vs. hydrogen as an unlimited bank for "quick" electricity storage and dispersal.
5. Evaluate hybrid vehicles and the solutions they offer in recycling vehicle momentum.
6. Measure and compare torque and horsepower gains and losses for alternative fuel applications.
7. Apply various electrical generation options (solar, wind, and heat) to commercial vehicles.
8. Create and wire in alternative fuel components to OEM (original equipment manufacture) application.
9. Locate and inventory state and federal regulations pertaining to alternative fuel applications.
10. Implement the research and development process for a proposed project.
11. Fabricate alternative fuel system conversion components as the need for innovation arises.
12 Quickly and efficiently locate and secure commercial grade hardware and components in a cost-effective manner.

13. Identify government and private grant funding sources.

Topics and Scope:

1. Current Ultra Low Emissions Technology
   a. Strategies
   b. Cleaner motors
   c. Cleaner fuels
   d. Different forms of stored energy (hydrocarbons)
2. Current Zero Emissions Technology
   a. Hydrogen cells
   b. Electric motors
   c. Bio-Fuels
3. The Lost 100-Year-Old Ultra Low Emissions Technology
   a. Diesel motors
   b. Peanut oil
   c. More efficient fuel burner
   d. Bio-fuel resurgence
4. Hydrogen and Hydrogen Cell Technology
   a. Hydrogen fuel abundance
   b. Electricity from pure hydrogen
   c. Electricity from hydrocarbons
   d. Skipping the heat process
   e. Battery technology and limitations
5. Recycling Vehicle Momentum through Regenerative Braking
   a. Current hybrid vehicles and designs
   b. Limitations of current regenerative brakes
   c. Case study of original regenerative brakes used on locomotives
   d. Trains from the turn of the century to present
6. Electrically Propelled Vehicles
   a. The original electric trains, busses, trucks, and trolleys
   b. Current designs
   c. Incorporating solar cells
   d. Parking lots/instant plug-in solar lots
   e. Wind charging stations
7. Experimentation
   a. Bio-fuel diesel motors
   b. Wind and solar compensation for heavy-duty applications
   c. Regenerative braking through electromagnetic drive-line brakes
8. Emissions Regulations
   a. Air quality guidelines and how to locate them
   b. Federal and state emissions standards
   c. Waiver rules
9. Torque and Horsepower vs. Clean Air
   a. Hooking up and manipulating heavy duty motors on dynometer
   b. Measuring and charting horsepower gains and losses
   c. Is using alternative fuels worth the power loss?
10. Research and Development (R & D)
   a. The process
   b. Internet research on similar ideas
   c. City and county contacts
   d. In-house machining, welding, and building

11. Commercial Grade Parts
    a. Sources of used parts
    b. Building from basic components
12. Non-Profit Status
    a. Grant writing
    b. Sponsorship
    c. Government and private grant sources

Assignment:

1. Assigned readings, 10-40 pages per week.
2. 1-2 group research reports of 3-5 pages in length on topics such as: existing technology, grant sources, existing research and development projects, public alternative fuel uses, case studies. Oral presentation of findings.
3. Implement the research and development process to produce alternative fuel components and an alternative fuel add on.
4. Locate and interpret research performed by other groups in order that research and development steps will not be repeated.
5. Design a control to ensure that research and development will be performed efficiently and interpreted correctly.
6. Design and create an alternative fuels product including fabrication and installation of alternative fuel components.
7. Test alternative fuel components and produce a bar graph illustrating torque gains and losses.
8. Disassemble and reassemble zero emission components such as electric regenerative brakes.
9. Mid-term and final exam covering terms and concepts.

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Research reports; research and development process description	Writing 30 - 35%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Alternative fuels product; component test and evaluation	Problem solving 30 - 35%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Dissasembly and reassembly	Skill Demonstrations 5 - 10%

Exams: All forms of formal testing, other than skill performance exams.

Exams: multiple choice, true/false, matching items, completion, short answer	Exams 20 - 25%

Other: Includes any assessment tools that do not logically fit into the above categories.

Oral presentation, attendance and participation.	Other Category 10 - 15%

Representative Textbooks and Materials:
Instructor prepared materials
Designated web sites