

CATALOG INFORMATION

Dept and Nbr: DET 190.1      Title: ALT FUELS AND SYSTEMS  
Full Title: Alternative Fuels and Fuel Systems  
Last Reviewed: 3/28/2011

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

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

**Catalog Description:**  
This course will provide an introduction to non-traditional fuels and conversion of internal combustion fuel systems to natural gas, bio-fuels, and other alternative fuel systems.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: This course will provide an introduction to non-traditional fuels and conversion of internal combustion fuel systems to natural gas, bio-fuels, and other alternative fuel systems.  
(Grade or P/NP)  
Prerequisites/Corequisites:  
Recommended: Eligibility for ENGL 100 or ESL 100  
Limits on Enrollment:  
Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU GE:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>IGETC:</b>	<b>Transfer Area</b>	<b>Effective:</b>	<b>Inactive:</b>
<b>CSU Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>
<b>UC Transfer:</b>		<b>Effective:</b>	<b>Inactive:</b>

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon successful completion of the course, students will be able to:

1. Differentiate between traditional and "alternative" fuel.
2. Identify and describe fuels classified as "alternative" to gasoline.
3. Explain the origin, manufacture and use of alternative fuels.
4. Relate specific alternative fuels to their appropriate application.
5. Identify and describe alternative fuel processing and fuel combining technologies.
6. Locate and utilize current information on research, invention, and innovation.

### **Topics and Scope:**

- I. Clean fuels: An overview
  - A. Traditional fuels
  - B. Alternative fuels
  - C. Clean air legislation
  - D. Electricity as a fuel
- II. Fuel types, origin, manufacturing and use
  - A. Gaseous fuels
    1. LPG (liquefied petroleum gas or propane)
    2. CNG (compressed natural gas)
    3. LNG (liquefied natural gas)
    4. Gasoline as a source of hydrogen
    5. Hydrogen fuel compressed from hydrocarbon chain
  - B. Bio-fuels
    1. Methane
    2. SVO (straight vegetable oil)
    3. Bio-diesel
    4. Ethanol
    5. Methanol
    6. Sun diesel
    7. Hydrogen fuel compressed from electrolyzed water

- 8. Water as a fuel
- C. Electric fuels
  - 1. Hydrogen cells
  - 2. Wave generators
  - 3. Solar cells
  - 4. Geothermal
  - 5. Hydrogrid
  - 6. Free standing generators
  - 7. Wind
  - 8. Earth turbine
- III. Fuel Processing Technologies
  - A. Direct injection / compression ignition diesel motors
  - B. Gasoline direct injection
  - C. Jet engine processing technologies
  - D. Electric fuel processing technologies
    - 1. Lithium ion batteries
    - 2. Nano-coating cell technology
    - 3. In-wheel hub electric direct drive
    - 4. Compressed air (France)
- IV. Fuel Combining Technologies
  - A. Hybrid
  - B. Plug-in hybrids
  - C. Hydraulic hybrid
  - D. Regenerative braking
- V. Centers of Research, Invention, and Innovation
  - A. Rocky Mountain Institute
  - B. NBEAA (North Bay Electric Automobile Association)
  - C. CalCars
  - D. E-Traction
  - E. Landfill Energy Systems
  - F. Sonoma County Sustainable Transportation Center (SOCOSTC)
  - G. Research programs
  - H. National and regional associations and organizations
  - I. National, state, and local government programs

### **Assignment:**

Representative assignments:

- 1. Readings (approximately 5-10 pages per week) and discussion of traditional and alternative fuels.
- 2. Field trips (1-4 during regularly scheduled class session(s)) to local alternative fuel facilities and/or refining facility.
- 3. Field notes.
- 4. Group research reports (1-2) on topics such as: existing technology, existing research and development projects, public alternative fuel uses, case studies. 3-5 pages each and oral presentation of findings.
- 5. Final project: research and written report (5-7 pages) on a selected alternative fuel technology or related topic. In-class presentation.
- 6. Final exam.

## 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.

Final project report

Writing  
40 - 60%

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

Group research report

Problem solving  
10 - 20%

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

None

Skill Demonstrations  
0 - 0%

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

Short answer

Exams  
20 - 40%

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

Attendance and participation; class presentation; field notes

Other Category  
10 - 20%

## Representative Textbooks and Materials:

Instructor prepared materials

Alternative Fuels: The Future of Hydrogen, by Michael Hordeski. Fairmont Press, Incorporated, 2008.

Alternative Fuels and Electric Vehicle Technology, by David Lang. Spirit Publications, 2005.

ASME Turbo Expo: Biomass and Alternative Fuels, Innovations. American Society of Mechanical Engineers, 2004. (Classic)

Alternative Diesel Fuels. Society of Automotive Engineers, Incorporated, 2004. (Classic)