DET 191 Course Outline as of Spring 2007

CATALOG INFORMATION

Dept and Nbr: DET 191 Title: ADV. ALTERNATIVE FUELS
Full Title: Advanced Alternative Fuels
Last Reviewed: 4/3/2006

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.00	17.5	Lecture Scheduled	35.00
Minimum	3.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	5.00		Contact Total	87.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 70.00 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:	AUTO 191
Formerly:	

Catalog Description:
This course will cover development, implementation, and repair procedures for alternative fuel motors currently being used for commercial applications. The course will focus on bio-diesel, methane, natural gas, and propane fuels. Course examines how motors that are adapted to operate using these fuels are being utilized in cities, farms, power generation facilities and freight environments.

Prerequisites/Corequisites:
Course Completion of DET 190 OR Course Completion of AUTO 190

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: Implementation, development, and repair procedures for alternative fuel motors currently used for commercial applications in cities, power generation facilities, freight, and on farms. Emphasis on bio-diesel, methane, natural gas and propane fuels. (Grade Only)
Prerequisites/Corequisites: Course Completion of DET 190 OR Course Completion of AUTO

190
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:

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:
Major Applicable Course

COURSE CONTENT

Outcomes and Objectives:
Upon successful completion of this course the student will be able to:
1. Critique the progress and limitations of current alternative fuel applications.
2. Describe bio-diesel, natural gas, propane, and methane as fuel sources.
3. Evaluate the effectiveness of bio-diesel, natural gas, propane, and methane for high compression diesel motors and fuel economy.
4. Compare the pros and cons of each alternative fuel with respect to a variety of factors.
5. Evaluate the current fuel production infrastructure and propose modifications that will make alternative fuel motors a viable, large-scale option.
6. Compare and contrast the levels of labor involved in converting an existing motor technology for operation on natural gas vs. bio-diesel vs. propane vs. methane.
7. Repair and maintain the alternative fuel motor.
8. Locate and interpret city, state, and federal regulations governing alternative fuel application.
9. Fabricate alternative fuel system conversion components as the need for innovation arises.
10. Locate and interpret reports on research and development performed by other groups.

Topics and Scope:

1. Progress and Limitations of Alternative Fuels
 a. Current status

1. Progress
2. Limitations

b. Benefits

1. Reduced green house gases
   a. Are we achieving results with alternative fuel?
   b. Are sacrifices of current reliable infrastructure worth it?
2. A finite fuel vs. an unlimited source
3. Short term vs. permanent solutions

2. Mandated Alternative Fuels

a. Natural gas
b. Propane
c. Methane
d. Bio-diesel

3. Pros and Cons of Each Alternative Fuel: Natural Gas, Propane, Methane, Bio-diesel

a. Extra cost above base motor cost
b. Horsepower
c. Petroleum base vs. organic
d. By-products
e. Motor longevity
f. Maintenance
g. Ease of repair
h. User friendliness
i. Safety
j. Reliability
k. Emissions

4. Alternative Fuel Motor Support and Infrastructure

a. Support

1. Mechanics
2. Warranty

b. Infrastructure

1. Fuel sources
2. After-market sources
3. Fuel shortages
4. Local manufacturers

5. Intensity of Conversion (Natural Gas, Propane, Bio-diesel)

a. Factory conversions
b. Aftermarket conversions
c. Original designs
d. Component fabrication
e. No conversions

6. Removal, Diagnosis, Repair, and Reinstallation

a. Design study
b. Failure analysis
c. Upkeep

7. Research and Development

a. The process
b. Internet research on similar ideas

Assignment:

Representative assignments:

1. Assigned readings, 10-40 pages per week.
2. Disassemble and reassemble alternative fuel modifications to pre-existing diesel technology.
3. Disassemble defective methane-fueled engine components and inspect for defects.
4. Diagnose, remove, repair and reinstall engine components.
5. Conduct library and Internet research and write a 3-5 page report on a topic such as: city, county, and state mandates for low emissions; low emission solutions in different locales; infrastructure to support alternative fuel technologies; pros and cons of main alternative fuels.
6. Oral report on research findings.
7. Final performance exam: Diagnose and/or repair alternative fuel applications.

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; R & D process description.	Writing 30 - 40%

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

Diagnose and repair; component testing & eval.	Problem solving 20 - 30%

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

Performance exams	Skill Demonstrations 30 - 40%

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

None	Exams 0 - 0%

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

Attendance and participation.	Other Category 10 - 20%

Representative Textbooks and Materials:
Instructor prepared materials.
Designated web sites.