

Course: ME 494/599 (Biodiesel Production and Application) Spring 2006

Instructors: Prof. Butch Irick

Texts: Biodiesel, Growing a New Economy: Pahl, Greg, Chelsea Green Publishing Company, ISBN 1931498652
Various Journal articles to be assigned throughout semester

Course Objectives: The objectives of this course are:

- To learn about the need for biofuels.
- To review the current production methods of biodiesel.
- To demonstrate the homebrewing method for making biodiesel
- To understand ASTM biodiesel quality testing procedures and importance
- To develop and working knowledge of biodiesel production and use for outreach activities.

Grading: Grades will be based on the following:

Website development	10%
Paper 1	15%
Paper 2	15%
Lab Notebook	20%
Final Paper	40%

Policies:

Students will have to find assigned journal articles using the UT Library electronic journal database.

Students will be required to keep extensive lab notebooks to document oil processing, feedstock quality, product yield, and final product quality.

Absences from labs are excused only if the absence was due to circumstances beyond your control (illness, etc.)

Course description:

The class will be centered on producing biodiesel for the UT Biodiesel Production Plant. Students will collect waste cooking oil; process the oil into biodiesel and get the biodiesel tested for quality. The student produced biodiesel meeting quality standards will be used in UT Facility Service vehicles. Production will be directed and supervised by Dr. Irick and once a week students will attend a formal meeting with Dr. Irick to be given assigned journal material and to give progress reports.

The students will be required to read numerous published articles on biodiesel production, application, engine performance, quality control and emissions. Students will be required to submit journal style articles summarizing the results of the aspect of research they were involved in and are encouraged to present their research at any university student exhibition, undergraduate research conference or student section of a professional organization. The results of the student's work will be published on the UT Biodiesel website devoted to the student's work.

An online notebook will be maintained documenting the progress of each team through the program. Each team will post their results to the internet site. Students will be assigned portions of the website to update and maintain.

A large portion of the UT Biodiesel Production Pilot Plant is outreach; students that participate in self directed biodiesel outreach events will be awarded extra credit based on documentation and perceived effectiveness.

Assignments:

Paper 1: Quality control and homebrewing: A literature and internet source review on quality issues not taken care of by homebrewers and resources available to biodiesel homebrewers.
2 to 3 pages SAE journal format.

Paper 2: Comparison of tail pipe emissions and well to wheel emissions between ultra low sulfur diesel and biodiesel.
2 to 3 pages SAE journal format.

Final Paper: Summary of all work performed and suggestions for future research.
5 to 7 pages SAE journal format.

Journal articles:

Production:

Technical aspects of biodiesel production by transesterification—a review, L.C. Meher, D. Vidya Sagar, S.N. Naik, Elsevier, Renewable and Sustainable Energy Reviews

Biodiesel processing and production, Jon Van Gerpen*, Elsevier

Biodiesel production: a review, Fangrui Maa, Milford A. Hannab,*

Biodiesel Production and Fuel Quality, Jon Van Gerpen

Biodiesel production from high FFA rubber seed oil, A.S. Ramadhas*, S. Jayaraj, C. Muraleedharan

Biodiesel from Used Frying Oil. Variables Affecting the Yields and Characteristics of the Biodiesel, Jose´ M. Encinar,* Juan F. Gonza´lez, and Antonio Rodr´ıguez-Reinares

Catalytic production of biodiesel from soy-bean oil, used frying oil and tallow R. Alcantara, J. Amores, L. Canoira*, E. Fidalgo, M.J. Franco, A. Navarro

A PILOT PLANT TO PRODUCE BIODIESEL FROM HIGH FREE FATTY ACID FEEDSTOCKS M. Canakci, J. Van Gerpen

Production of biodiesel from waste frying oils Pedro Felizardo a, M. Joana Neiva Correia a,* , Idalina Raposo b, Joa˜o F. Mendes c, Rui Berkemeier d, Joa˜o Moura Bordado

Emissions:

Performance and exhaust emissions of a biodiesel engine Mustafa Canakci a,* , Ahmet Erdil b, Erol Arcakliog˘lu

Exhaust emissions from a Diesel engine fueled with transesterified waste olive oil M.P. Doradoa,* , E. Ballesterosb, J.M. Arnalc, J. Go´mez, F.J. Lo´pezd

Waste control

Biological Treatment of Wastewater Discharged from Biodiesel Fuel Production Plant with Alkali-Catalyzed Transesterification Ken-ichiro Suehara,1* Yoshihiro Kawamoto, Eiko Fujii, Jiro Kohda, Yasuhisa Nakano, and Takuo Yano