Biomass Conversion to Biofuels and Bioenergy BE 410, Fall 2009
Course Syllabus

Instructors:
Samir K. Khanal
Office: Agricultural Science 415O Telephone: 956-3812
Office Hours: TBA Email: khanal@hawaii.edu

Scott Turn
Office: Hawaii Natural Energy Institute **Telephone: 956-2346**
Office Hours: TBA Email: sturn@hawaii.edu

Field Trip Co-Coordinator: *Ryan Kurasaki*
Office: AEI 105 Email: rkurasak@hawaii.edu
Telephone: 956-7259

Teaching Assistant:
There will be a teaching assistant assigned for this class. If you have questions related to the material, you may request a meeting with the TA:

Devin Takara (E-mail: takarad@hawaii.edu, Ag. Sci. 415 Hallway.

Meeting Times and Locations: The classes will be held in TBA. The venue and time will be TBA. The exam and field trip dates will be announced in the first class. Any change in class schedule will be announced a week in advance except for unforeseen circumstances.

Grading:		
	Exam-1:	20%
	Exam-2:	20%
	Exam-3:	20%
	Homework:	20%
	Lab project:	20%

You must submit homework on due date. Failure to submit on time will be penalized unless good justification is given. All exams will have equal weightage.

Objectives of the course: The objectives of this course are as follows:

a) To provide a thorough understanding of various renewable feedstocks of importance to Hawaii, their availability and attributes for biofuels [production.
b) To provide a thorough understanding of the broad concept of second and third generation biofuel production from biomass and other low-cost agri-residues and biowastes.
c) To provide students with tools and knowledge necessary for biofuel facility operations.
d) To teach our students to analyze and design processes for biofuel production.

Textbook: Biorenewable Resources: Engineering New Products from Agriculture. Robert C. Brown. Wiley-Blackwell Publishing (2003).

Reference book: Anaerobic Biotechnology for Bioenergy Production: Principles and Applications. Samir K. Khanal. Wiley-Blackwell Publishing (2008).

Other Reference materials: USDA and USDOE bimass/biofuel report, and video shows

Notes, handouts, and supplementary readings will be posted on Laulima:
https://laulima.hawaii.edu/portal
(Log on with your UH username and password)

Prerequisites: BE 373 or Consent

Catalog Description: 3 credits. Fundamental concepts in understanding biofuel/bioenergy; renewable feedstocks, their production, availability and attributes for biofuel/bioenergy production; types of biomass-derived fuels and energy; thermochemical conversion of biomass to heat, power, and fuel; biochemical conversion of biomass to fuel; biodiesel production; environmental impacts of biofuel production; economics and life-cycle analysis of biofuel; value-added processing of biofuel residues; case studies on biofuel production.

Week	Topics
1	Course outline, current energy consumption, overview of biofuel/bioenergy and biorefinery concepts
2	Fundamental concepts in understanding biofuel/bioenergy production
3	Renewable feedstocks and their production (Special lecture)
4	Feedstocks availability, characterization and attributes for biofuel/bioenergy production
5	Biomass preprocessing: drying, size reduction, and densification
6	Various biofuels/bioenergy from biomass
7	Biomass conversion to heat and power: thermal gasification of biomass, anaerobic digestion
8	Biomass conversion to biofuel: thermochemical conversion, syngas fermentation
9	Biochemical conversion to ethanol: biomass pretreatment
10	Different enzymes, enzyme hydrolysis, and their applications in ethanol production
11	Biodiesel production from oil seeds, waste oils and algae
12	Environmental impacts of biofuel production
13	Energy balance and life-cycle analysis of biofuel production (special lecture)
14	Value-added processing of biofuel residues and co-products;
15	Field visit to a biofuel/bioenergy plant in Hawaii: Possible Companies: H Power, Oils of Aloha, Pacific Biodiesel and HC & S Company

Course Policies:

1. All assignments will be given during the lecture week and students will be given a week to complete them. No late submissions will be accepted, unless prior written permission is obtained from the instructor. For late submissions, a copy of this instructor's approval must be attached to the front of the homework packet or it will not be graded.
2. Copying homework solutions from a copy of the solution manual or from another student is strictly forbidden and is considered cheating. First offenses will result in a grade of zero on the homework. Repeated offenses will result in a failing grade for the class.
3. Questions and intellectual discussion are strongly encouraged during the class. The course instructor and TA are available to you during scheduled office hours. The instructor and TA will answer questions by e-mail or phone, or arrange for meetings outside of class.
4. Grading is relative and is primarily judged by student's critical thinking capability. The instructor will grade all exam answer sheets to examine your understanding of subject matter. Verbosity without concise discussion will receive poor evaluation.
5. **Cell phone, computers, and other electronics** must be turned off and placed in a backpack during the entire examination. The back pack must be placed at the front of the examination room for the entire examination. Failure to do so will be considered cheating and you will receive a score of zero on the examination.
6. A student will fail for the semester for any incidence of cheating on an examination.
7. Talking and eating during the class is strictly prohibited.