Advanced Biofuel Production from Renewable Resources
Fall 2013 Syllabus, Louisiana State University

Meeting Schedule: Lecture: 4:30-7:20 pm M, location 115 EB Doran

Textbook: Robert C. Brown. Biorenewable Resources. Blackwell Publishing. Iowa State Press. 2003

Pre-requisite: Transport Phenomena, Thermodynamics, or consent of Instructor

Instructor: Dorin Boldor, PhD E-mail: dboldor@agcenter.lsu.edu Phone: 225.578.7763
175 EB Doran Bldg Office Hours: T: 10:30 - 11:30 am (or by appointment)

Teaching Assistants: TBA

THIS COURSE INCLUDES A SERVICE-LEARNING COMPONENT (see Service-Learning Design Project Activities)

Course Objectives:

The course covers the principles of biofuel production using different technologies. Fundamental concepts are used to design different engineering processes required for production of bioethanol, biodiesel, bio-oil, and other biobased products. The specific objectives of the course are to:

1. Identify, define, and explain the different products that can be obtained from renewable resources, as well as how they are obtained.
2. Apply knowledge of mathematics, science, and engineering to create biofuels and other products from renewable resources (ABET Objective a.)
3. Learn to design and conduct experiments for production of biofuels and other products from [illegible] (ABET Objective b.)
4. Identify the relevant operating parameters and use them to design a system, component, or engineering process to meet desired needs (ABET Objective c.)
5. Identify, formulate and solve biological engineering problems based on the physical and [illegible]
6. Learn techniques, skill, and modern engineering tools necessary for the engineering practice (ABET Objective k.)
7. Learn to function in multidisciplinary teams addressing contemporary issues in engineering-related properties of biological materials, with an understanding of the professional and ethical responsibility when communicating and collaborating with outside community partners. (ABET Objectives d., f., g., j.)
8. Reflect on the learning experience provided in the service learning component of the course, and understand the need for life-long learning and the impact engineering practice and solutions have on the society (ABET Objectives h., i.)

Web Page

A course web page will be made available through LSU's Moodle to enhance the course contents. Students are requested to visit this web site on a regular basis. The course web site contains the course [illegible]

Service-Learning Design Project Activities, Expectations, Policies, and Evaluation

THIS COURSE INCLUDES A SERVICE-LEARNING COMPONENT [illegible]

to gain further understanding of course content, a deeper appreciation of the discipline, and an

enhanced sense of civic responsibility. The rationale behind this S-L design project is to relate the course content to the way elementary school students understand these engineering and scientific concepts. By having to present it to elementary school students, you will have to break it down and reduce it to the appropriate level of comprehension. Through this exercise you will be able to enhance your own understanding of the course materials.

- Semester Design Project: Students will be divided into random groups of 2-3 students, and each group will design, develop, and present a biofuel or a biobased experimental project.
- Subsequently, each group will have to modify their project in order to be utilized in K-12 science education (target grade to be determined), i.e., bioethanol, biodiesel, biogas, bioplastics, etc. The [illegible] must be approved by September [illegible]. You are expected to complete all design assignments (with the exception of the final presentations) by November 20th.
- Each group will be provided with the course materials (lecture notes, presentations, problems, and [illegible]

Course Policies

- Homework is due at the beginning of class on the due date. Homework assignments turned in late [illegible] but also on style (you do get style points for well organized homework). Same is true for project reports.
- **Exams** will be closed book, but divided into two sections: theory and problems. Each student will be allowed a single page, handwritten with equations. As you are currently learning to think on your [illegible] problems. NO CELLPHONES, IPODS, IPADS, LAPTOPS, or any other electronic devices are allowed at [illegible] exam is turned in, at which time the calculator can be retrieved and used for the problems section. [illegible] given for each one missed.
- Any student requiring **special arrangements** for taking exams, taking notes and other special needs [illegible] your strengths and weaknesses in learning.

I am available for questions outside of class. Please stop by my office if you need my help, even if outside office hours. If I am busy and do not have time to meet with you, I will tell you and we can schedule a meeting at another time. If you have trouble finding me, or our schedules do not coincide, you can make an appointment by either Email (dboldor@agcenter.lsu.edu) or Phone. If we make an [illegible]

Academic Integrity and Academic Misconduct

Students are expected to comply with the Code of Student Conduct at all times throughout this course. For your information, the Code of Student Conduct can be found at **http://appl003.lsu.edu/slas/dos.nsf/$Content/Code+of+Conduct?OpenDocument**

Grading policy: Grades will be determined based on the following breakdown:

Mid-term Exam	25 % (A1)
Final Exam	30 % (A2)
Homework (both content and presentation – writing skills)	15 % (A3)
Project Design	20 % (A4)
S-L Project Performance	10 % (A5)

To calculate your grade: Grade = A1*0.25 + A2*0.30 + A3*0.15 + A4*0.20 + A5*0.10

A:	> 90	B:	80-89.9

Tentative Topics (it may change):

Lecture No.	Topics	
1	Introduction to syllabus	
2	Overview of mass and energy balance	
	Carbohydrates	
4	Ligno-cellulosic	
5	Starches	
6	Oils and fats	
7	Resource base (chapter 3)	
8	Production of feedstock and properties(PHA, PHB)	
9	Oil production from algae	
10	Post harvest treatment(drying, size reduction, densification, storage)	
11	Logistics and transport	
	Anaerobic digestion	
14, 15, 16	Thermo chemical Processes – Gasification, Pyrolysis, Liquefaction	
17	Pretreatment, fermentation of sugar and starches Ethanol combustion	
18,19	Lipid extraction and fermentation	
20,21	Biochemical conversion	
22	Transesterification (acid, base, enzymatic catalyst) Oil extraction	
23	Jet fuel production (cracking)	
24	Environmental impact	
25	Economics	
26, 27	Specialty chemical production	
28,29	Marketing policies, politics; global impact; economical and political	