

Biomass Conversion to Biofuels

COURSE INFORMATION

1. Instructors

Name	Phone Number	Email
Dr. Su Ha	(509) 335-3786	suha@wsu.edu
Dr. Bernie Van Wie	(509) 335-4103	bvanwie@wsu.edu

2. TA Office Hour

Name	Office Time	Office Location	Email
William Schlecht	Tuesday Between 12Noon and 1:30PM	Daggy Hall #116	william.schlecht@email.wsu.edu

3. Lecture and Office Hour

Lecture	Office Hour
M,W,F 3:10-4:00PM Sloan Hall #163	Ha: Wed 4:10 – 5:10PM, or by appointment Van Wie: Tu, Th 4:10 – 4:50 PM or appointment

4. Objectives

Introduce the fundamentals of biomass and its conversion technologies. Specific topics include:

- Introduction to biorenewable resources: Brief history, motivation, and challenges
- Fundamentals: Engineering thermodynamics and organic chemistry
- Properties of biomass
- Preparation of biorenewable resources
- Production from biorenewable resources: Bioenergy, Transportation fuels, and Chemicals
- Conversion processes of biorenewable resources: Heat & Power, Chemicals & Fuels, Other value added products
 - Chemical conversion processes (Dr. Garcia-Perez)
 - Biodiesel (Dr. He)
- Process integration and system design using Pro II

5. Textbooks

There is a required textbook for this course:

- Brown, R.C. 2003. Biorenewable Resources-Engineering New Products from Agriculture. 1st ed. Blackwell Publishing, ISBN-13: 978-0-8138-2263-1.

Handouts prepared by the instructors will be used along with other assigned readings. In addition the following reference books may be used:

- Bridgwater, A.V. (Editor) 2001. Progress in Thermochemical Biomass Conversion: 2 Volumes, Blackwell Publishing, Inc. ISBN: 0632055332.
- Kamm, B. Gruber, P.R. and Kamm, M. (Editors) 2006. Biorefineries – Industrial Process and Products.

- Klass, D.L. 1998. Biomass for Renewable Energy, Fuels, and Chemicals. 1st ed. Academic Press. ISBN: 0124109500.
- Knothe, G., Krahl, J., and Van Gerpen, J., Biodiesel Handbook, American Oil Chemists Society.
- Osamu, K. and C.W. Hall (Editors) 1989. Biomass Handbook. 1st ed. Golden and Breach Publishers. ISBN: 2881242693.
- Pahl, G. and McKibben, B. Biodiesel: Growing a New Energy Economy, Chelsea Green Publishing.
- Quaak, P., H. Knoef, and H. Stassen. 1999. Energy from Biomass: A Review of Combustion and Gasification Technologies (World Bank Technical Paper). World Bank Publications. ISBN: 0821343351.
- Ratledge, C. and B. Kristiansen. 2006. Basic Biotechnology. Cambridge University Press. ISBN: 13-978-0-521-84031-6 (hardback) & 13-978-0-521-54958-5 (paperback).
- Wall, J.D., C.H. Harwood, and A. Demain. 2008. Bioenergy. ASM Press. ISBN 978-1-55581-478-6.

6. Classroom Participation

Student attendance at all scheduled class periods is expected. Student participation in class discussions regarding the material covered is strongly encouraged because it enhances the learning experience by improving the students' understanding of the material. Students' criticism, comments, or requests for special assistance of any nature are welcome; however, class time is not generally available for this purpose. Negative, unrelated input and comments during class that disrupt class are unacceptable.

7. Homework Assignments

Homework will be handed out at the end of each chapter and special requirements regarding the homework assignments will be provided by instructors for each chapter.

8. Oral Presentations

The students will be grouped in teams and conduct literature reviews on biomass conversion research. The instructor will announce the team arrangement within the first month of the semester. Each team will select one specific research topic related to biomass conversion technology. After the selection, each team will discuss its selected research topic with the instructors. Once the instructors approve the research topic, the students can start the literature review. Based on their literature review, the students will prepare a 20 min. oral presentation. Additional instructions and required formats of the oral presentation will be given by the instructors.

9. Pro II Project

Prof. Van Wie will introduce the Pro II program and teach you how to use it for biomass conversion process integration and systems design. Based on this students will be given a Pro II Project where they need to simulate a given specific biomass conversion technology (e.g., A corn to bioethanol conversion process).

10. Laboratory (One time only)

There will be one lab period for this course. The lab period will be used for a hands-on laboratory exercise and will be conducted in teams at the University of Idaho. However, students are required to turn in individual reports, which will be counted as their homework grade. There will be *no make-up lab*. In this lab, students will synthesize biodiesel from biomass under the guidance of Prof. Brain He, Agricultural & Biosystems Engr., UI.

11. Course Website

The URL of the course website is: <http://www.che.wsu.edu/~suha/ChE481/index.htm>. From the site handouts, homework assignments, laboratory materials, and other related materials can be accessed and/or downloaded.

12. Grading

	Percentages
Mid-term Exam	25%
Final Exam (Pro II)	30%

