

Plants for Bioenergy

11:776:410 (3 credits)

Fall Semester (odd years)

Monday, Wednesday (lecture) 10:55 AM – 12:15 PM 191B Foran Hall

CONTACT INFORMATION

Instructor: Dr. Stacy Bonos
Office Location: 239A Foran Hall, 59 Dudley Rd., New Brunswick, NJ 08901
Phone: 848-932-6367
E-mail: bonos@rutgers.edu
Office Hours: by arrangement

COURSE DESCRIPTION

This course will introduce the topic of bioenergy and discuss various renewable energy sources from biomass. Agronomic and bioenergy traits will be discussed for each biomass source. Conversion technologies from different biomass sources will also be discussed.

COURSE WEBSITE, RESOURCES AND MATERIALS

- Course website: Sakai
- Supplemental materials posted to Sakai. **Note:** Use of lecture and handout material provided on Sakai for Plants for Bioenergy is for the sole use of registered students for educational purposes only. Other than a single copy, materials may not be reproduced or used otherwise without the written consent of both instructors.

PREREQUISITES

None

COURSE LEARNING GOALS

(Link to Plant Biology Undergraduate Program Goals: <http://plantbiology.rutgers.edu/undergrad/plantbiology/>)

By the end of this course, the student will be able to:

1. Address issues of biomass/biofuels utilization and potential primarily in the U.S (addresses program goal 1)
2. Students will learn about the biochemistry and production characteristics of major crops, crop types and residues (addresses program goal 1)
3. Examine and discuss biomass conversion technologies for potential energy generation from plant based agriculture (addresses program goal 2)

ASSIGNMENTS/RESPONSIBILITIES & ASSESSMENT

Grading: Grades will be determined based on six topic quizzes (75% of grade) and participation/discussion of current events (25%) on relevant bioenergy topics. Scale: 90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D

Learning goals assessment: Specific questions on quizzes will be used to assess student knowledge of all course learning goals. Student grasp of bioenergy issues in context (course learning goal 3) will be assessed during class discussions. The percentage score on these assessments will determine the level of mastery: >90% outstanding; 80-89% good; 70-70% satisfactory; <69% unsatisfactory.

PARTICIPATION GRADE AND ABSENCE POLICY

Students unable to attend may contact the instructor via e-mail prior to the missed class or may use the University absence reporting website (<https://sims.rutgers.edu/ssra/>) to indicate the date and reason for the absence. An e-mail is automatically sent to the instructor.

COURSE SCHEDULE

Lecture	Topic
Introduction	
1	Introduction, course syllabus – What are biofuels?
2	“Energetics” and conversion-heat vs. work energy
3	US energy portfolio biomass inventories (USDOE Billion Ton Report)
4	NJAES biomass assessment
5	Field Trip – HFIII – Energy Crops
Crops for Biofuels – Sugar/Starch Crops	
6	Fermentation (sugars, starches, cellulosic) (Quiz on Introduction)
7	Sugarcane/sweet sorghum/sugar beet (current events)
8	Starch grains (corn, grain sorghum), cassava, potatoes, etc.
Crops for Biofuels – Grass/Fiber Crops	
9	Fiber conversion biochemistry/combustion (Quiz on Sugar/Starch Crops)
10	Switchgrass and other prairie grasses (current events)
11	Miscanthus and other herbaceous plants/ “weeds” (current events)
12	Woody crops (willow, poplar, etc.) (current events)
13	Duckweed
Breeding Biofuels	
14	Traditional plant breeding (current events)
	Spring recess
15	Biotechnology (current events)
16	Biotechnology (Quiz on Traditional Plant Breeding and Fiber Crops)
Other Biofuel Sources – Crop Residues + Waste	
17	Anaerobic digestion
18	Yard/municipal wastes/food and spent oil, fruit/vegetable field and processing wastes (current events)
19	Row crop residues, moldy hay, bagasse (current events)
20	Landis Sewerage Authority
21	Thermochemical (F-T, pyrolysis)
22	Oil crops (soybean, canola, tropical, etc.)
23	Hazelnut (Quiz on Crop Residues + Waste) (current events)
Crops for Biofuels – Oil Crops	
24	Oil biochemistry/algae
Thanksgiving Break	
25	Algae (current events)
26	Renmatix
Harvest, Handling, Storage, Processing, Quality Analysis	
27	NEWBio grant/anthracnose switchgrass research (current events)
28	Harvest methods, moisture, timing/lab analysis, transportation, harvest and storage (Quiz on Oil Crops/Harvest, etc.) (current events)

FINAL EXAM DATE AND TIME

There is no final exam for this course.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy/>

The principles of academic integrity require that a student:

- Properly acknowledge and cite all use of the ideas, results, or words of others.
- Properly acknowledge all contributors to a given piece of work.
- Make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- Obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- Treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that:

- Everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.
- The reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.