

Our Sustainable Future – BILD 42
Introduction to renewable energy and bioproducts
Course Syllabus – Spring 2021
Tu-Th 3:30 – 4:50 pm – Remote

Prerequisites:

none

Course Description:

This course examines current energy, food, and materials, production and use, and introduces alternative technologies that will help us create a more sustainable future. It provides an overview of existing energy utilization, production and infrastructure, and covers the consequences of our energy choices on the environment and our health. The course also discusses the relationship between energy, food, and water, and introduces the field of renewable and alternative energy including solar, wind, and biofuels. We then cover current food production and discuss the future foods that are being developed today. The course then focuses on various biofuel feed stocks and technologies, examining the chemistry; biology; and the biochemical, genetic, and molecular approaches being developed to advance the next generation of biofuels and bioproducts, including renewable plastics and future foods. Overall the course emphasizes the importance of developing more sustainable living practices as we begin to develop replacements for the diminishing supplies of fossil fuels, and on reducing our carbon and energy footprint so that we can maintain the environment that we enjoy today.

Course Goals/ Learning Objectives:

- 1) Students will recognize the types and differences between existing energy resources, understand their procurement and utilization, and their impacts on society and the environment.
- 2) Students will be knowledgeable of the existing and potential future sources of renewable energy, and be able to intelligently analyze reported aspects of the energy and renewable energy fields.
- 3) Students will be introduced to the scientific literature, and will learn to interpret the mass media presentation of energy issues, and be able to access the primary scientific literature to help make informed decisions on renewable energy choices.

Lectures: This class is scheduled for Tu-Th from 3:30 to 4:50. The class will have a total of 30 hours of in class lectures, and additional lectures that have been pre-recorded and can be viewed at any time by students enrolled in the class. In addition, there will be two mid-terms and these will also be on (April 23 and May 21), and a final on June 11 from 3 to 6 pm. The lectures scheduled for each week are listed by the day, while the pre-recorded lectures will not be given in class, and will be available on Canvas.

Sections: Students are REQUIRED to sign up for a section and to attend those section for 1 hour each week.

Quizzes: During each section there will be a short quiz focused on the book chapters and journal articles assigned the previous week. There will be 8 quizzes total, and there are no make-ups for missed quizzes. You can miss one quiz without any impact on your overall grade, as the lowest quiz grade will be dropped.

Final Project:

What is your carbon footprint?

Tell us why and how you might be able to use sustainable energy to make it better.
Details will be provided during Section.

Grading:

40% Midterm Exams

 20% midterm 1

 20% midterm 2

30% Final Exam

30% Section Activities

 10% Quizzes

 20% Carbon footprint

Textbook:

Our Energy Future an introduction to renewable energy and biofuels Jones and Mayfield.

BILD 42 Sp21 Course Schedule:

Lecture	Topic	Book Chapter	Date
21-1	Introduction to Energy – Food - Water	1	March 30
21-2	History of fossil fuel and future prospects of fossil energy	2	April 1
	<i>Energy by the Numbers (Murphy)</i> <i>Introduction to Energy (Mayfield)</i>		
21-3	Climate Change	3	April 6
21-4	Renewable Energy Sources	4	April 8
	<i>Electric vehicles, Smart grid and energy storage (Torres)</i> <i>Wind Power and Turbine Technologies (Bazilevs)</i> <i>Photovoltaic and Photothermal Energy Production (Coimbra)</i>		
21-5	Electric Cars and Battery Technology	5	April 13
21-6	Industrial Agriculture	6	April 15
	<i>Energy and Modern Agriculture (Briggs)</i> <i>Climate Change and Food Security (Burney)</i> <i>Water and Climate Change in California (Cayan)</i> <i>Biofuels water and the environment (Mayfield)</i>		
21-7	Future Foods	7	April 20
	1st Mid-term Exam		April 22
	<i>Corn ethanol (Smith)</i>		
21-8	Renewable Fuels – First Generation Ethanol	7	April 27
21-9	First Generation Biofuels – Biodiesel	7	April 29
	<i>Alternative Sources of Biomass Jatropha (Schmidt)</i> <i>Cellulosic ethanol commercialization (Rubino)</i>		
21-10	Second Generation Biofuels – Cellulosic Ethanol	9	May 4
21-11	Aquatic Biomass – Cyanobacteria, Diatoms & Algae	9	May 6
	<i>Production Process for Biofuels from Algae (McBride)</i>		
21-12	Synthetic Biology for Enhanced BioProducts production	10	May 11
21-13	Production Processes for BioProducts from Algae	8	May 13
	<i>Biogas (Hein)</i>	11	
21-14	Renewable and Biodegradable Polymers from Algae	12	May 18
	2nd Mid-term Exam		May 20
21-15	Economic of Energy	13	May 25
21-16	Life Cycle Assessment and Politics and Policy of Energy	14	May 27
	<i>Economics of Energy (Graff Zivin)</i>		
21-17	Special Guest Lecture	15	June 1
21-18	Final Thoughts On - Our Sustainable Future		June 3
	<i>Importance of Energy for the Bottom Billion (McCord)</i> <i>Energy Services for the Remote Communities of Nepal (Zahnd)</i> <i>The International Politics of Climate Change Outline (Victor)</i>		
	Final 3:00 – 6:00 pm Monday		June 7