Our Energy Future - BIBC 140
Introduction to renewable energy and biofuels
Course Syllabus – Spring 2017

Prerequisites:
BILD 1 & CHEM 6A

Course Description:
This course examines current energy production and use and introduces alternative energy technologies for creating a 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 and food and water, and how energy impacts their production and delivery. We then introduce the field of renewable and alternative energy including solar, wind, nuclear, and biofuels. 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. Overall the course emphasizes the importance of developing biofuel as a contributing replacement for the diminishing supplies of fossil fuels, and on reducing the consequences of carbon dioxide release into the environment – ultimately creating a sustainable energy future.

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 M-W-F from 2 to 2:50. The class will have a total of 30 hours of lectures, and one third of the lectures have been pre-recorded and can be viewed at any time by students enrolled in the class. There will be several lectures and discussions that are NOT pre-recorded and these will be given on Mondays and Wednesday, and these will be recorded for podcast. In addition, there will be two mid-terms and these will also be on Wednesdays (April 26 and May 24), and a final on June 16. The lectures scheduled for each week are listed by the day, but lectures listed for Friday are pre-recoded and will not be given in class, only on TritonEd. Friday class time will be available for any questions and discussion.

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
- 15% Quizzes
- 15% Carbon footprint

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

BIBC 140 SP17 Course Schedule:

Day	Topic	Book Chapter Paper	Date
1	Introduction to Renewable Energy	1	April 3
2	History of fossil fuel and future prospects of fossil fuel	2 Hydrocarbon N America	April 5
3	*Energy by the Numbers (Murphy)* *Introduction to Energy (Mayfield)*		*April 7*
4	Climate Change	3	April 10
5	Renewable Energy Sources	4 Climate Change	April 12
6	*The Future of Nuclear-based Energy Sources (Tynan)* *Electric vehicles, Smart grid and energy storage (Torres)* *Wind Power and Turbine Technologies (Bazilevs)* *Photovoltaic and Photothermal Energy Production (Coimbra)*		*April 14*
7	Industrial Agriculture	5	April 17
8	Renewable Fuels Biological Sources	6 Green Revolution	April 19
9	*Energy and Modern Agriculture (Briggs)* *Climate Change and Food Security (Burney)*		*April 21*
10	First Generation Biofuels – Corn and Sugarcane Ethanol	7	April 24
11	1St Mid-term Exam		April 26
12	*Corn ethanol (Smith)*		*April 28*
13	Biodiesel Chemistry and Analysis (Pomeroy)	7	May 1
14	Second Generation Biofuels – cellulosic ethanol (Joe Ostrand)	7 Oil Crops	May 3
15	*Alternative Sources of Biomass Jatropha (Schmidt)* *Cellulosic ethanol commercialization (Rubino)*		*May 5*
16	Aquatic Biomass – Cyanobacteria, Diatoms & Algae	9	May 8
17	Production Processes for Biofuels from Algae	9 Biofuels from algae	May 10
18	*Production Process for Biofuels from Algae (McBride)*		*May 12*
19	Synthetic biology for enhanced biofuel production	10	May 15
20	Biogas and Biohydrogen	8 Fracking	May 17
21	*Biogas (Hein)* *Thermochemical Conversion of Biomass to Fuel and Electricity (Herz)*	11	*May 19*
22	Nutrient Utilization and Recycling and Water Use	12	May 22
23	2nd Mid-term Exam		May 24
24	*Water and Climate Change in California (Cayan)* *Biofuels water and the environment (Mayfield)*		*May 26*
25	Memorial Day	13	May 29
26	Economic of Energy	14 Politics of Biofuels	May 31

27	*Economics of Energy (Graff Zivin)*		*June 2*
28	Life Cycle Assessment		June 5
29	Politics and Policy of Energy	15	June 7
30	*Importance of Energy for the Bottom Billion (McCord)* *Energy Services for the Remote Communities of Nepal (Zahnd)* *The International Politics of Climate Change Outline (Victor)*		*June 9*
30	Final 3:00 – 6:00 pm		June 16