Brown University	
Chem0080E **Exploration of the Chemistry of Renewable Energy**	**Kathleen M. Hess, Ph.D.** **Fall 2016**

Objectives of the Course: Students will learn about the various types of renewable energy sources and the chemistry associated with each. The course will include short laboratories to illustrate the application of the energy sources. Renewable energy will be discussed in relationship to environmental factors and social impact. Active learning strategies will be used throughout the course.

Learning Objectives

- Define and discuss the chemistry associated with certain types of renewable energy sources.
- Perform and analyze data from experiments that illustrate basic concepts of the chemistry of certain types of renewable energy sources.
- Discuss and summarize the presentations of various guest speakers that provide expertise on topics related to the global impact of energy resources.
- Discuss and explain reading materials related to course topics through written and class discussions.
- Create written and grey literature to demonstrate understanding and application of certain renewable energy sources.

Location & Course Meetings

- MacMillan 205, *No food or drink is allowed in the classroom at anytime*.
- Tuesday and Thursday, 9-10:20 am

Communication with instructor

- 401/863-1193
- Kathleen_Hess@brown.edu (preferred method of communication)
- Class announcements will be generated through Canvas.
- Office Hours (virtual and/or in person): TBD

Required Textbook/Materials

Course content will only be electronic. Materials will be available on the Canvas website.

Course-Related Work Expectations

Over 14 weeks, students will spend 3 hours per week in class (42 hours total). Readings, laboratory preparation/reports, essays, reading responses, and completion of class project are estimated to be 10 hours per week. In addition, there is a final exam (reflective essay), which assumes approximately 2-3 hours of metacognitive review of the course material.

Assessment

Weighted sum based on the following:

- 25% Lab assignments & preparation
- 35% Project: paper, grey literature (brochure), presentation
- 20% Summary essays for guest speakers (lowest grade dropped if all essays completed)
- 15% Class discussions, online reading responses, and participation
- 5% Final exam= Reflective essay

Accommodations

- Brown University is committed to full inclusion of all students. Please inform me early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information, please contact: **Student and Employee Accessibility Services** at 401-863-9588 or SEAS@brown.edu.
- Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

Classroom policies & student expectations

- **Attendance and lateness**: Class attendance is mandatory. Please arrive on time.
- **Electronic devices**: Please turn off and silence all electronic devices during class.
- **Absences:** Students may be excused from up to 2 class sessions with a note from Health Services or a Brown University Dean's note. Please see me about missed assignments on those days. Please consult with me if a more extended absence is expected**.**
- **Academic honesty:** Please note that 'sharing' your work or duplicating *any* or *all* parts of another student's work is plagiarism and is considered academic dishonesty. This includes using reports/paragraphs posted on FACEBOOK pages or other Internet sites in your assignments. You are required to prepare original work throughout the semester. Uploaded assignments are directly

submitted to an anti-plagiarism site, Turnitin.com, through the Canvas site. Brown's academic codes for undergraduate and graduate students can be found: https://www.brown.edu/academics/college/degree/policies/academic-code

- **Class participation**: Students are required to participate throughout each class meeting. A grade for participation is part of your final grade.
- **Guidelines for class discussions & participation**

Source: http://www.crlt.umich.edu/node/58410

1. Respect others' rights to hold opinions and beliefs that differ from your own. Challenge or criticize the idea, not the person.
2. Listen carefully to what others are saying even when you disagree with what is being said. Comments that you make (asking for clarification, sharing critiques, expanding on a point, etc.) should reflect that you have paid attention to the speaker's comments.
3. Be courteous. Don't interrupt or engage in private conversations while others are speaking.
4. Support your statements. Use evidence and provide a rationale for your points.
5. Allow everyone the chance to talk. If you have much to say, try to hold back a bit; if you are hesitant to speak, look for opportunities to contribute to the discussion.

Course readings and assignments

- As this is a WRIT-designated course, you will be completing essays throughout the semester and producing a paper associated with your class project. You will receive substantive feedback on your writing, which will help you complete subsequent writing assignments.
- The Friday before each week of class, a module will appear in Canvas. The module will contain the required readings and assignments for the following week.
- For most readings assigned, you will be asked to write a short reading response or answer a few questions that only the instructor will able to view and make comments. This format will be used to allow each individual student the opportunity to become familiar with the class material before participating in a class discussion about the same material. As the semester progresses, assignments associated with the readings maybe formatted as a collective student discussion and students will be able to view and comment on all postings.

- Due dates & time for most writing assignments are listed in the class schedule and will always be posted in Canvas. *Canvas will always have the list of due dates for all assignments.*
- Laboratory reports will have due date/time assigned once the experiment is completed. These floating due dates are necessary to ensure that the experiment is completed thoroughly.
- All assignments for the course will be electronic. Assignments will uploaded in the Canvas site as pdf files or uploaded into LabArchives. Some assignments will be completed through the Canvas quiz tool. Each assignment will include details for the type of upload for the file.
- Late work of any kind (anytime paste the due date & time) will have a 10% deduction in grade. Assignments later than 4 days, will receive a 50% deduction in grade. No assignments will be accepted beyond 1 week from the original due date & time.
- Extensions for due dates will be considered if requested with supporting documentation from Health services or a Brown University Dean.

Laboratory Policies

- LabArchives electronic notebooks will be used to collect data for all experiments. iPads will be available for use during the class time.
- Before the lab day, read the procedure and write a short summary of the procedure in the folder on LabArchives for the appropriate experiment.
- Safety procedures will provided for each experiment and must be followed throughout the experiment.
- Safety goggles must be worn at all times during the experiment and will be provided. On the days of experiments, please wear long pants and closed toe shoes are mandatory. No tank tops, backless or mid-driff tops are allowed on laboratory days.

Course Outline

This outline maybe modified at the discretion of the instructor based on the progress of the class
See the Canvas website for weekly readings & responses associated with each topic and activity/lab.
**Due dates & time will be assigned once experiment is complete*

Week of	Tuesday	Lab/Activity	Assignment Due	Thursday	Lab/Activity	Assignment Due
9/5	9/6 ----			9/8 Introduction	Introduction activity	-----
9/12	9/13 Why do we need renewable energy sources?	LabArchives introduction	Welcome assignment	9/15 Why do we need renewable energy sources?	Experiment 1* & energy units	Experiment 1 preparation
9/19	9/20 Why do we need renewable energy sources?	Experiment 2 John Kromer Science Librarian	Experiment 2 preparation	9/22 *Dr. Dave Murray* *Brown University* *(guest speaker)*	Continue with experiment 2*	*Read Guest speaker pre-presentation materials*
9/26	9/27 How are biofuels of oil used as energy sources?	Experiment 3	*Guest speaker essay-1* Experiment 3 preparation	9/29 *Jon Lowell* *ISO-NE* *(guest speaker)*	Continue with experiment 3*	*Read Guest speaker pre-presentation materials*
10/3	10/4 How are biofuels of oil used as energy sources?	Experiment 4	*Guest speaker essay-2* Experiment 4 preparation	10/6 *Dr. Bathsheba Demuth* *Brown University* *(guest speaker)*	Continue with experiment 4*	*Read Guest speaker pre-presentation materials*
10/10	10/11 How are biofuels of oil used as energy sources?	Experiment 5	*Guest speaker essay-3* Experiment 5 preparation	10/13 How are biofuels of oil used as energy sources?	Continue with experiment 5*	Topic for class project

Week of	Tuesday	Lab/Activity	Assignment Due	Thursday	Lab/Activity	Assignment Due
10/17	10/18 *"Green" Energy Walking tour of Brown*	-----	*Read Guest speaker pre-presentation materials*	10/20 How are batteries and solar panels used as energy sources?	Experiment 6	*Essay about Green Energy tour of Brown-4* Experiment 6 preparation
10/24	10/25 How are batteries and solar panels used as energy sources?	Continue with experiment 6*	-----	10/27 How are batteries and solar panels used as energy sources?	Experiment 7	Outline of paper and bibliography Experiment 7 preparation
10/31	11/1 *Mark Durrenberger Clean Energy New England (guest speaker)*	Continue with experiment 7	*Read Guest speaker pre-presentation materials*	11/3 Feedback on outline of paper & bibliography	Continue with experiment 7	*Guest speaker essay-5*
11/7	11/8 *Albert Dahlberg Brown University (guest speaker)*	Continue with experiment 7*	*Read Guest speaker pre-presentation materials*	11/10 How are fuel cells used as energy sources?	Experiment 8	*Guest speaker essay-6* Experiment 8 preparation
11/14	11/15 How are fuel cells used as energy sources?	Continue with Experiment 8	----	11/17 How are fuel cells used as energy sources?	Continue with Experiment 8*	Project Paper
11/21	Presentation preparation	Catch-up lab day		Thanksgiving holiday	----	---
11/28	Presentation preparation	------	----	Presentations	---	Project Brochure
12/5	Presentations	------	----	Presentations	---	
12/12	Wednesday, 12/14 Final Exam, 2pm					