

Course Syllabus  
**SRE 335/535 – Renewable Energy**  
Spring 2018  
Tuesday/Thursday 2:00-3:20pm

**Instructor:** Dr. Neal M. Abrams

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**Office hours:** M 1:50-2:45p, Th 9:30-10:20a

*Other days/times by appointment*

### **Description**

Three hours of lecture/discussion concerning renewable energy technology, markets and policy. Topics include: the technology of renewable energy and the development of markets for energy efficiency and renewable power. The role and impacts of energy regulation on markets will also be examined.

### **Course learning outcomes**

1. Explain the development of renewable energy, its current status in the U.S., and its projected development.
2. Compare and contrast the different types of renewable energy, the origins of these sources, how they can be harnessed, and their potential size.
3. Explain the technological function of renewable energy technologies and distinguish the pros and cons of each source for different applications.
4. Design a renewable energy system to support a set of functional requirements.
5. Explain the factors, either barriers or incentives, that influence the development of renewable energy in the U.S.
6. Critically analyze both popular and scientific literature about renewable energy.

### **Program learning outcomes**

- This is a required course for the Renewable Energy option in the Division of Environmental Science.

### **College learning outcomes**

1. Scientific Reasoning
2. Quantitative Reasoning
3. Basic Communication Skills
4. Technological and Information Literacy
5. Values, Ethics and Diverse Perspectives
6. Critical Thinking

### **Textbooks and supplies**

A scientific-style calculator will be needed frequently in class and required to complete exams.

## Major concepts and methodologies

1. Overview of energy use in the world and the U.S.
2. Historical and current use of renewable energy in the world and the U.S.
3. Combined heat and power technologies and applications.
4. Wind power concepts, development and future prospects.
5. Solar power concepts, development and future prospects.
6. Geothermal power concepts, development and future prospects.
7. Hydro power concepts, development and future prospects.
8. The role of renewable energy in addressing climate change
9. Policies that influence the development of renewable energy

## Grading

Grading will be based on participation (10%), homework and group assignments (20%), the flash talk (15%), and exams and quizzes (55%). There will be up to (8) quizzes given during the semester and the scores of the top 5 will be included in determining your grade. Makeup quizzes will not be offered. There will be a cumulative final exam. Graduate students will be graded to a higher standard, and will have an additional written paper and/or presentation in the course.

### Grading Scale

<b>A</b>	<b>A<sup>-</sup></b>	<b>B<sup>+</sup></b>	<b>B</b>	<b>B<sup>-</sup></b>	<b>C<sup>+</sup></b>	<b>C</b>	<b>C<sup>-</sup></b>	<b>D</b>	<b>F</b>
(93 – 100)	(90 – 92)	(87 – 89)	(83 – 86)	(80 – 82)	(77 – 79)	(73 – 76)	(70 – 72)	(60 – 69)	(≤ 59)

## Attendance policy

Attendance is expected at all lectures. On the rare occasion that you cannot make it to class, online course notes and peer assistance can provide some information on the missed work. You are responsible for all content covered in the course.

## Accommodations for Students with Disabilities

SUNY-ESF works with the Office of Disability Services (ODS) at Syracuse University, who is responsible for coordinating disability-related accommodations. Students can contact ODS at 804 University Avenue- Room 309, 315-443-4498 to schedule an appointment and discuss their needs and the process for requesting accommodations. Students may also contact the ESF Office of Student Affairs, 110 Bray Hall, 315-470-6660 for assistance with the process. To learn more about ODS, visit <http://disabilityservices.syr.edu>. Authorized accommodation forms must be in the instructor's possession one week prior to any anticipated accommodation. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

## **Academic Integrity**

Academic dishonesty is a breach of trust between a student, one's fellow students, or the instructor(s). By registering for courses at ESF you acknowledge your awareness of the ESF Code of Student Conduct (<http://www.esf.edu/students/handbook/StudentHB.05.pdf>), in particular academic dishonesty includes but is not limited to plagiarism and cheating, and other forms of academic misconduct. The Academic Integrity Handbook contains further information and guidance (<http://www.esf.edu/students/integrity/>). Infractions of the academic integrity code may lead to academic penalties as per the ESF Grading Policy: <http://www.esf.edu/provost/policies/documents/GradingPolicy.11.12.2013.pdf>.

## **Readings**

Assigned readings are expected to be completed before the discussion period. Although students are not responsible for memorizing equations or graphs from readings, they are expected to be able to discuss the findings of each piece.

## **Flash talks**

Everyone will be responsible for giving a 5-6 minute "flash talk" to the class. You can choose the topic that will be the subject of your flash talk, although it must relate to the material covered in the class during the semester. It should also be a current and novel topic. Each flash talk should use a PowerPoint-style presentation to provide the background and content, and future prospects. There will be a brief Q&A session at the end, making the whole talk no longer than 8 minutes. You will be graded on the accuracy and quality of the information presented, the clarity of the presentation, and its relevance to the class. Your instructor must approve the subject of the flash talk before it is given. Flash talks will be discussed in greater detail during beginning part of the semester.

Graduate students enrolled in SRE535 can substitute a comprehensive presentation in lieu of the flash talk, with approval of the instructor.

## **Participation**

In-class participation is a valuable instructional method and therefore an important component of the final grade for the semester. Frequent contributions are expected and encouraged, including thoughts, opinions, and questions. These contributions will be noted and factored into your participation grade. Not everyone is equally comfortable with routinely participating in discussion during the lecture, however, and illness may cause you to miss a lecture on a topic that you are interested in discussing. A forum has been set up on the course's Blackboard site to enable online discussion of the topics covered in class. While you are encouraged to actively participate during the lectures, participation points can also be earned by participating via the Blackboard forum by, for example, writing a response to a topic covered during lecture or posting a link to an interesting news article on renewable energy along with your thoughts on the article.

## **Course topics**

Unit 1: Introduction, energy conversion, and electricity

Unit 2: Energy from the sun

Unit 3: Energy from fluids

Unit 4: Bioenergy

Unit 5: Energy for storage transportation

## Course schedule

Class	Date	Topic	
1	1/16	Energy concepts and principles of renewable energy	
2	1/18	Overview of global energy use and technology	Unit 1
3	1/23	Quantifying energy	
4	1/25	Introduction to electricity	
5	1/30	Solar energy fundamentals	
6	2/1	Solar thermal systems	Unit 2
7	2/6	Solar photovoltaic cell fundamentals	
8	2/8	Solar photovoltaic materials	
9	2/13	Solar photovoltaic components	
10	2/15	Solar photovoltaic installation and integration	
11	2/20	Novel solar	
12	2/22	Exam 1	
13	2/27	Hydropower	Unit 3
14	3/1	Wind as a resource	
15	3/6	Wind siting	
16	3/8	Wind technology	
	3/13 & 3/15	Spring Break	
17	3/20	Ocean, wave, and tidal energy	
18	3/22	Geothermal energy	
19	3/27	Review	
20	3/29	Exam 2	
21	4/3	Biomass from photosynthesis	Unit 4
22	4/5	Thermochemical energy	
23	4/10	Chemical and biochemical energy	
24	4/12	Storage: Batteries and capacitors	
25	4/17	Fuel cell chemistry	
26	4/19	Fuel cell technology	Unit 5
27	4/24	TBD	
28	4/26	Energy systems integration	
29	5/1	Energy systems integration and review	
	TBA	Cumulative final exam	

**Topics and dates are subject to change.**