

## **CME 305 - Sustainable Energy Systems for Buildings**

3 Credits (3 Lecture Hours)

**Lecture** – Meets in 148 Baker Lab - Monday, Wednesday, and Fridays 9:30-10:25 AM

**Instructor** – Paul Crovella

219 Baker Laboratory

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Office hours – M,W,F 10:30-11:30, T,R 9:30 – 10:30

Graduate Assistant – Sean Woods, TBA Baker Lab

Office hours – TBA

### **Required Text-**

Residential Energy : cost savings and comfort for existing buildings/Krigger and Dorsi. 5<sup>th</sup> edition. Saturn Resource Management, 2009.

### **Reference Texts –**

Understanding Renewable Energy Systems/Quaschnig. Earthscan, 2005.

Sustainable Energy Systems Engineering/Gevorkian. McGraw-Hill, 2007.

**Description** - This course is designed to explore construction management-related issues in creating a more sustainable energy use in our building stock. Integrating sustainable energy sources in construction as well as issues related to using energy more efficiently will be covered.

The student will be expected to develop skills which help them succeed in construction management:

### **Student outcomes**

1. The student will be able to show how building energy use is quantified, how to perform a building energy audit, and explain the various methods of rating energy efficiency in buildings.
2. The student will demonstrate the ability to distinguish between different site-based sustainable energy sources for building operation, and evaluate them based on technical, economic, and environmental considerations.
3. The student will understand the methods used for increasing the energy efficiency of buildings, and specifically how to ensure that said measures are implemented correctly during construction.
4. The student will appreciate the role played by the energy modeling in new construction, and the impacts of construction management on the assumptions used in the models.

**Attendance** - Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class.

While in class, please keep cell phones turned off, this includes during tests (no cell phone calculators).

To maintain the proper classroom environment, laptop computers may not be used during lecture without permission of the instructor. They should be used during class for taking notes not for games or watching videos.

**Academic Honesty** – Honesty and integrity are the foundation of professional behavior and are expected of each student. Any assignment (including those in electronic media) submitted by a student must be of the student's original authorship. Representation of another's work as the student's own shall constitute plagiarism. Cheating, in any form, is an unacceptable behavior within all college courses, and the Code of Student Conduct (as outlined in the ESF student handbook <http://www.esf.edu/students/handbook/0910StHandbk.pdf> ) will be strictly adhered to.

**Grading** – The course grading will be a combination of grades earned on technical reports, quizzes, an individual project, a class presentation, and a final exam.

The final grade will be based on these percentages

Technical Reports	35%
Quizzes	35%
Individual project	15%
Class presentation	5%
Final Exam	10%

**Homework** – The technical reports will be prepared according to separate guidelines that will be provided. At a minimum all written work must be word-processed and spell checked. Any calculations may be hand-written neatly with the answer labeled with units and boxed. Any report not turned in on-time needs to be discussed with me to determine if credit will be given. No late work will be accepted after the assignment has been graded and returned to the rest of the class.

Week	Topic	Reading	Report topic
1	Introduction, types of energy, measuring energy	<u>Residential Energy</u> 13-36	1. Personal Introduction 2. Building Energy Use – Personal Experience
2	Solar energy characteristics		Solar horizon evaluation
3	Photovoltaics		Analysis of Sunviewer data for Walters Hall

4	Solar domestic hot water		Analysis of flat plate collector data from Near Westside
5	Wind		NY Smallwind Resource Explorer exercise
6	Biofuels, geothermal, fuel cell, CHP		<i>Potential Free Watt exercise</i>
7	Heat loss- conduction	<u>Residential Energy</u> chap 2	Building Shell Upgrades exercise
8	Heat loss – infiltration	<u>Residential Energy</u> chap 3	Infiltration exercise
9	Insulation	<u>Residential Energy</u> chap 4	<i>Potential insulation tester exercise</i>
10	Windows and Doors	<u>Residential Energy</u> chap 5	<i>Potential Syron window exercise</i>
11	Lighting	<u>Residential Energy</u> chap 7	<i>Potential HDR exercise</i>
12	Energy Modeling	Rescheck and Comcheck documentation	<i>Potential E-Quest or RemRate modeling</i>
13	Student presentations		
14	Graduate student presentations		

## Lab Report Format

For your each lab report, you will write a summary of the information found during your assignment work. In particular you will describe your findings relative to the topic being explored.

The report will follow a format that is commonly used in science/engineering courses. This format will allow a user with a technical background, but with no familiarity with the project to understand your purpose, approach, and findings. A report of this type would be typical for presenting a detailed investigation of a technical construction issue to a designer or construction manager.

The report needs to follow this format:

1. Cover page – a sheet with the title of the report, the author’s name, the date of the report and for whom the report was prepared. It can contain a graphic, and other information, but it must contain the data above. (10)
2. Table of Contents – This should allow a user to quickly access the part of the report that they are interested in. The table of contents should list each of the sections below, and include a page number for the section. If appendices are included, they should be identified (e.g. Appendix A – Soil boring log, Appendix B- Soil profiles, Appendix C – Pictures of soil samples) (10)
3. Introduction – This should describe the purpose of the report. Why is this work being performed? What is the goal of performing this work? What will be learned by performing this work? (20)
4. Method – How did you go about performing the work? What process, method, or technique was used? Describe the way that you determined the values that are reported in the results section. You should explain what theory is relevant for the work that you are doing. (20)
5. Summary of results – You should report what values you determined. This should be presented in a table format, charts, graphs, etc. to make it easy to analyze. You should also include any relevant reference values, etc. Be sure to identify what units the values are measured in. (20)
6. Conclusions – What did the results tell you about what you wanted to know? How did the values compare to the reference values? What did you learn by performing these tests? (20)
7. Appendix (if relevant) – Information that does not fit into the main body of the report, but is referenced by the report, or is of interest to the reader.

The report should be word processed and spell checked. In the interest of conserving paper, I appreciate printing on both sides of the page.