

SYLLABUS: EEL 4935-003/EEL 6935-003 - SUSTAINABLE ENERGY

CROSS-LISTED IN CHEMISTRY AS CHM 4932-003/6938-003

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Office: ENB 372A

Office Hours: M/W 1-3 pm.

Target group: 3000-4000/6000. This course aims to give an interdisciplinary introduction to the field and is open to students from all engineering and science departments. A basic knowledge of physics and math will be required.

Course Materials: A number of scientific publications, book excerpts, public policy documents/panel reports, and various web resources will be used. All documents will be posted on Blackboard.

COURSE OBJECTIVES:

- a) Introduce to the scientific background of energy conversion, storage and consumption.
- b) Quantify the impact of the various energy conversion and storage technologies, as well as paths of energy use/consumption.
- c) Discuss feasibility/cost of the most prominent sustainable energy conversion methods.
- d) Discuss challenges to achieve sustainable energy conversion.

COURSE DESCRIPTION:

This course aims to introduce students to concepts of sustainable energy conversion. Solar, wind, hydroelectricity, hydrogen, biomass and geothermal energy conversion methods as well as main storage technologies will be discussed. These major conversion methods will be quantitatively compared throughout the course with the main energy consumption pathways of human societies in different parts of the globe. Energy consumption of transportation, heating/cooling, food production and manufacturing of

goods will be discussed. Energy savings potentials of the various consumption pathways will also be examined. After successful participation in this course students will be able to assess technological aspects of public energy policy, as well as have the foundation for advanced study of sustainable energy topics.

Pre-requisites: None. Physics I may help understanding some basic phenomena.

COURSE STRUCTURE:

Two lectures per week.

Location: CHE 217

Time: M/W 4:35pm-5:50pm

TA: TBA

STUDENTS' OBLIGATIONS:

Read materials posted on Canvas before class.

COMMUNICATION POLICY:

The instructor will use Blackboard (URL: <https://my.usf.edu>) as main communication channel for announcements and course materials. All students are expected to check Blackboard at least once every 48 hours for course announcements.

GRADING POLICY:

This is a combined graduate/undergraduate course. Two different grading policies will therefore apply:

1) Graduate Students:

| | | |
|--------------|-------------------------|------|
| Final Grade: | 2 Exams; No final exam. | ~50% |
| | Approximately 6 quizzes | ~25% |
| | Web site (see below) | ~25% |

2) Undergraduate Students:

| | | |
|--------------|-------------------------|------|
| Final Grade: | 2 Exams; No final exam. | ~70% |
|--------------|-------------------------|------|

Approximately 6 quizzes ~30%

Grades will be assigned according to the following approximate scale:

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|---|--------|
| A | >90% |
| B | 80-89% |
| C | 70-79% |
| D | 60-69% |
| F | <60% |

-Graduate and undergraduate cohorts will be curved independently to achieve fair grade distributions in both groups.

-There will be two non-comprehensive exams. Dates and details will be announced at least one week prior to each test.

-Make-up exams will be given only under very special circumstances. Appropriate documentation in writing (doctor's certificate, police report etc...) will have to be provided by the students.

-Quizzes will be given approximately every second week.

ADDITIONAL GRADUATE STUDENT OBLIGATIONS:

Graduate Students will (Undergraduates can for additional credit) design a web site for a sustainable energy related topic of their choice (approval of the instructor is needed). This website needs to contain:

- a) An introduction to the topic of choice
- b) A thorough background review
- c) A discussion of the currently pursued scientific/policy etc...approaches to the topic of choice
- d) A comprehensive list of references used for the website

- e) References must be clearly listed. Copy/pasting from the work of others will not be accepted (unless clearly marked with quotation marks and reference shown) and treated as plagiarism.

Procedure:

Graduate student abstracts for web sites are due on **Oct 2**. Write 1/2 page what topic will be discussed on your web site and what you plan to post.

Nov. 13: Graduate student web sites need to be posted on each student's USF web site, and working links emailed to the instructor.

After the links have been posted, all students of the class (including undergraduates) will grade the web sites and email their list of grades to the instructor (**deadline: Day of last class period before finals week**). The averages of the student's grades (50%), together with the instructor's grades (50%), will determine the final grade for each web site.

A word about "ethics":

The web sites are expected to contain only original text written by the authors themselves. Copy/pasting of passages from other sources and "mixing and matching" of such passages into a pseudo-original product constitutes plagiarism and will be treated as such. If such passages are discovered, zero points will result and meetings with the College Administration will be arranged. It is allowed to use figures from other work as long as proper reference is made (link to references page and/or to source directly must be posted).

NOTICE OF PERMISSION/NON-PERMISSION TO SELL NOTES OR RECORDINGS OF CLASS LECTURES:

It is not permitted to sell notes or recordings of class lectures. All unauthorized recordings of class are prohibited. Recordings that accommodate individual student needs must be approved in advance, and may be used for personal use during the semester only; redistribution is prohibited.

POLICY ON RELIGIOUS HOLIDAYS:

Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second class meeting.

POLICY ON CAMPUS EMERGENCIES:

In the event of an emergency, it may be necessary for USF to suspend normal operations. During this time, USF may opt to continue delivery of instruction through methods that include but are not limited to: Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It is the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USF, College, and department websites, emails, and MoBull messages for important general information.

TENTATIVE SCHEDULE:

This schedule is tentative and will likely change as we proceed through the semester.

| Week | Dates | Topics |
|------|---------------|--|
| 1 | Aug 26/28 | Fossil Fuels/CO ₂ : Currently our main energy source-Review of impact on environment and supply issues. |
| 2 | Sept 2/4 | Labor Day Discussion of “unconventional” fossil energy sources (tar sands, shale gas, fracking etc...). Quiz 1 |
| 3 | Sept 9/11 | Basic energy considerations, a bit of the old ‘thermo’ and some more basic physics, energy units. Transportation (cars, trains, planes) |
| 4 | Sept 16/18 | More transportation, Quiz 2 |
| 5 | Sept 23/25 | Solar Energy (photovoltaics, solar thermal) |
| 6 | Sept 30/Oct 2 | Solar Energy Quiz 3 Oct 2: Graduate student abstracts for web sites due. |
| 7 | Oct 7/9 | Solar Energy |
| 8 | Oct 14/16 | Solar energy Quiz 4 |

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| 9 | Oct 21/23 | Bioenergy Exam I |
| 10 | Oct 28/30 | Bioenergy, Wind Energy |
| 11 | Nov 4/6 | Guest lectures: Desi Saludes (HCC): Renewable Energy Program in Denmark, and Steven Polzin (CUTR): Public transport Quiz 5 |
| 12 | Nov 11/13 | Veteran's Day Energy Fluctuation and Storage Nov. 13: Graduate student web sited need to be posted and links emailed to the TA and the instructor. |
| 13 | Nov 18/20 | Fluctuations and storage/smart grid (guest lecture Lingling Fan, USF) Quiz 6 Thanksgiving |
| 14 | Nov 25/27 | Nuclear Energy |
| 15 | Dec 2/4 | Nuclear Energy; Exam II Dec. 4: All Students need to have their grades for the web sites emailed to the TA and the instructor. |
| 16 | Dec 9/11 | Finals Week - This course has no final exam. |