

## AME 577 – Survey of Energy and Power for a Sustainable Future – Spring 2018

**Lecture :** 12:30-1:50pm

**Final Exam:** Wednesday, May 4, 11 a.m.-1 p.m.

**Instructor:** John C. Hall, Ph.D.

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Office Hours: Monday and Wednesday before and after class in VHE M24

**Grader:** Yuxuan Zhang <[jiannanz@usc.edu](mailto:jiannanz@usc.edu)>

**Recommended Preparation:** B.S. in electrical engineering, mechanical engineering, aerospace engineering, physics or physical chemistry; AME seniors.

**Course Description:** This survey course is intended to familiarize the student with how modern civilization meets its energy needs, the sustainability of the present energy mix (largely coal, nuclear, natural gas, hydro) and options for a sustainable future (solar, wind, biomass, geothermal, ocean). The course will emphasize

- The economics of the decision process. Historically, at least in the United States green energy has been required to economically compete with existing sources.
- The influence of technology trades on the decision process.
- Technology status of sustainable energy options and the degree to which they practically been implemented to assure a sustainable future.
- The quantitative modeling of these options and the criticality of support systems (e.g., transmission lines, energy storage)
- Integration of sustainable energy into the present patterns of energy consumption.

The end objective of the course is that the students will leave with a broad understanding of sustainable energy options, trades to be made between these options and the processes from translating concept into reality.

Texts:

(Required) Sustainable Energy: Choosing Among Options by Jefferson W. Tester, Elizabeth M. Drake, Michael J. Driscoll, Michael W. Gorlay, and William A. Peters, MIT Press, Cambridge, MA, 2012, ISBN 978-0-262-01747-3.

Exams and Grading:

There will be both a midterm (33%) and a final exam (33%). In addition, I am requiring students to form small teams (no more than 4) and execute three projects. The balance of the grade will include a short written report and a 15minute oral report on each of the three projects.

Homework will be suggested but not collected or graded

## Course Schedule

Week	Monday	Topic(s)	Suggested Reading
1	1/8/18	Course Introduction, Pollution, Global Warming SAM Modeling Renewable Energy	Reference 1, chapters 1 - 3
2	1/15/18	MLK Present Energy Mix 1	Reference 1, chapter 8
3	1/22/18	Present Energy Mix 2 Conservation 1, Battery Electric Vehicles	Reference 1, chapter 8 Reference 1, chapter 18
4	1/29/18	Conservation 2, Airplanes to Buildings Nuclear Options 1	Reference 1, chapter 18 Reference 1 chapter 9
5	2/5/18	The Economics of Green Power (learning curves, economies of scale, LCOE, getting projects funded, maturity, incentives)	Reference 1, chapter 5
6	2/12/18	Nuclear Options 2 Project 1 Oral Reports - 1	Reference 1 chapter 9
7	2/19/18	Presidents' Day Project 1 Oral Reports - 2	
8	2/26/18	Mid term Geothermal	Reference 1 chapter 11
9	3/5/18	Wind 1 Wind 2	Reference 1, chapter 15
10	3/12/18	Spring break	
11	3/19/18	Project 2 Oral Reports - 1 Project 2 Oral Reports - 2	
12	3/26/18	Hydropower Tides Currents and Ocean Thermal Solar Photovoltaic 1	Reference 1, chapter 14 Reference 1, chapter 13
13	4/2/18	Solar Photovoltaic 2 CPV	Reference 1, chapter 13
14	4/9/18	CSP Biomass	Reference 1, chapter 13 Reference 1, chapter 10
15	4/16/18	Utility Power and Energy Storage - 1 Utility Power and Energy Storage - 2 Managing Green Power	Reference 1, chapter 17
16	4/23/18	Project 3 Oral Reports - 1 Project 3 Oral Reports - 2	
17	4/30/18	Final Exam (Friday, 5/04/2018, 11:00 am to 1:00 pm)	