Updated 09/10/18

39-610
Energy Conversion and Supply

Fall 2018

Carnegie Mellon University, Materials Science and Engineering
College of Engineering, Energy Science Technology & Policy

Online Course Description
This is the first course in the EST&P core mini-course sequence where masters students learn the basic workings of the systems that supply, distribute, and utilize energy. This class will consider fossil energy, nuclear energy, and renewable energy resources. The course will provide some basic thermodynamics and will cover both conventional and emerging energy conversion technologies. Specific technology examples may vary from semester to semester selected from such important topics as photovoltaics, fuel cells, carbon sequestration and biofuels.

Syllabus Course Description
This is the first of a four-mini-course sequence in which students learn the basic workings of the systems that supply, distribute, and utilize energy. This class will consider fossil energy, nuclear energy, and renewable energy resources. The course will also cover both conventional and emerging energy conversion technologies. The intent is to cover the basic physics and engineering principles that govern various energy resource types and energy conversion technologies, while also reviewing the social, political, and economic factors influencing the past, present, and future utilization of various energy resource types. *The lectures will be divided between foundational lectures by the instructor and informational presentations by student groups, with the latter focusing on specific energy resources.*

General Information
Lecture Day: Tuesday / Thursday
Lecture Time: 9:30-11:20 PM
Lecture Location: Wean Hall (WEH) 5415

Canvas Course Site
https://cmu.instructure.com
Readings, Homework, Grades will be posted on Canvas Course Site.

Contacts

Instructor: Paul A. Salvador
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Course Assistant: Ritu Philip
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Responsibilities include:
office hours (TBD)
grading: HW, presentation, reports, and exam.

Historical Notes
The course was originally taught by Prof. K. Barmak, from the MSE department at CMU.
Prof. Y. N. Picard, also from the MSE department at CMU, took over the course and modified the content into the current form.
Prof. Salvador, also from the MSE department at CMU, taught the course in Fall of 2017 for which he lightly modified the content of Prof. Picard and used Prof. Picard's course structure.
For the Fall of 2018, a similar structure will be used, but more significant modifications will be carried out.

Texts
There is not currently a required text for the course. Reading material will be placed on reserve in the Sorrell's (Engineering & Science) Library. Portions of the reserved items will be posted on the Canvas Course Site. Some resources that are available online will also be used.

Course material has been taken primarily from the following texts.

"Energy Resources" by T. I. Erski, Lulu Enterprises Incorporated, 2012.

"Fundamentals of Engineering Thermodynamics, 8th Ed.," M. J. Moran, H. N. Shapiro, D. B. Boettner, and M. B. Bailey, Wiley, 2014.

"Energy Systems Engineering, 3rd Ed.," F. M. Vanek, L. D. Albright, and L. T. Angenent, McGraw Hill, 2016.

The following texts provide additional sources for relevant material :

"Carbon-Free Energy Supply" by L.D. Danny Harvey, Earthscan, 2010.

"Energy Economics" by R. L. Nersesian, Routledge, 2016.

"Energy and Climate" by M. McElroy, Oxford University Press, 2016.

"Global Energy" by P. Ekins, M. Bradshaw and J. Watson, Oxford University Press, 2015.

Lecture
Class attendance is important. Students who attend lecture understand the material better and earn better grades than those who do not.

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone's learning experience if your cell phone, pager, laptop, etc. makes noise or is visually distracting during class.
For this reason:
mobile devices, other than laptops, must be turned off during class,
and laptops can be used only for notetaking, but the sound must be off.
No student may record or tape any classroom activity without the express written consent of Professors Salvador. If a student believes that he/she is disabled and needs to record or tape classroom activities, he/she should contact the Office of Equal Opportunity Services, Disability Resources to request an appropriate accommodation.

Assignments:

Both individual and group assignments will be given, as will a final exam.

Individual homework assignments may take the form of short reading/writing assignments and/or engineering problems. Reading assignments will require you to read an assigned article/report and answer a few questions, where answers are to be written in paragraph form. Writing assignments will be graded based on clarity, coherence/logic, persuasiveness and effective use of citations. Engineering problems will be graded based on your solution to the problem(s), and your documentation of the solution procedure.

For group assignments, you must coordinate and work within a group of (likely) 2-3 students and your grade will reflect your individual presentation and your collective group effort on a technical report.

Once submitted for grading, the group reports will be corrected for grammatical and major errors before being made available to the rest of the class for reference. These corrected reports and the associated presentation slides, along with homework solutions, will be course material where much of the final exam will cover.

You may discuss work with your co-students, the CA, and the Instructor. However, you may only submit your own work! Distinguish clearly between discussing aspects of the solution and working through to the final solution yourself.

Please see the policy at: www.cmu.edu/policies/documents/Cheating.html.

Evaluation and grading:

Homework Assignments	30%
Individual Group Presentation Grade	20%
Collective Group Report Grade	20%
Class participation	15%
Final exam (Date and Location to be determined)	15%
Total	100%

Other:

Please discuss any difficulties which you encounter with the course as soon as they arise: you are welcome to stop by my office, or to contact me to make an appointment. I shall make every effort to respond to e-mails within 24 hours during the work week, and over weekends. All assignments, course material and information will be posted on Blackboard.

Notice:

All course material for this class - such as posted lecture notes, assignments, solutions, exams, example problems, the syllabus and any and all handouts - is for use in this class only. No part of it is to posted or otherwise redistributed.

Academic Integrity

Cheating is unacceptable in any form.

Carnegie Mellon Code (http://www.cmu.edu/student-affairs/theword//code.html)

Students at Carnegie Mellon, because they are members of an academic community dedicated to the achievement of excellence, are expected to meet the highest standards of personal, ethical and moral conduct possible. These standards require personal integrity, a commitment to honesty without compromise, as well as truth without equivocation and a willingness to place the good of the community above the good the self. Obligations once undertaken must be met, commitments kept.

As members of the Carnegie Mellon community, individuals are expected to uphold the standards of the community in addition to holding others accountable for said standards. It is rare that the life of a student in an academic community can be so private that it will not affect the community as a whole or that the above standards do not apply.

The discovery, advancement and communication of knowledge are not possible without a commitment to these standards. Creativity cannot exist without acknowledgment of the creativity of others. New knowledge cannot be developed without credit for prior knowledge. Without the ability to trust that these principles will be observed, an academic community cannot exist. The commitment of its faculty, staff and students to these standards contributes to the high respect in which the Carnegie Mellon degree is held. Students must not destroy that respect by their failure to meet these standards. Students who cannot meet them should voluntarily withdraw from the University.

The consequences of an academic integrity violation vary depending on the severity of the incident. However, there are several outcomes that impact students during their time on campus that are common to all cases regardless of the particular details of the offense.http://www.cmu.edu/academic-integrity/understanding/cmu.html