

Updated August 28, 2016

39-610 Energy Conversion and Supply

Fall 2016

Units:	6
Contact sessions:	Tuesday, Thursday; 9:30 am – 11:20 am Wean Hall 5415
Instructor:	Prof. Yoosuf N. Picard, Roberts Engineering Hall 144 Tel. ×8-3044 e-mail: ypicard@cmu.edu
Office hours:	Monday 10:00am-12:00pm; Thursday 2:00pm-4:00pm
Course assistants:	TBD (Responsibilities will be homework grading)
Prescribed text:	None, but many materials will be taken from “Energy Systems Engineering 2 nd Edition” by Vanek and Albright, “Carbon-Free Energy Supply” by L.D. Danny Harvey, “Energy Economics” by Roy Nersesian, “Energy and Climate” by Michael McElroy, “Global Energy” by Ekins, Bradshaw and Watson, “Energy Resources” by Erski

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. Our 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.

Assignments:

Both individual and group assignments will be given. For group assignments, you must coordinate and work within a group of 2-3 students and your grade will reflect your individual presentation and your collective group effort on a technical report. Individual homework assignments may take the form of short writing assignments and/or engineering problems. Writing assignments will be graded based on clarity, coherence/logic, persuasiveness and effective use of citations. Reading assignments will require you to read an assigned article/report and answer a few questions, where answers are in paragraph form. Engineering problems will be graded based on your solution to the problem(s), and your documentation of the solution procedure. You may discuss the homework with your co-students, the CA and the Instructor. However, you may only submit your own work

– so 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%
<u>Final exam (Location and date TBD)</u>	<u>15%</u>
Total	100%

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.

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 be posted or otherwise redistributed.

The course schedule is given below. Please check Blackboard for updates.

Lecture	Date	Topics	Assignments
1	8/30	Course Introduction, Energy Units and Global Supply Overview	
2	9/1	Thermodynamics: Laws, Carnot Cycle/Engine, Efficiencies	Hwk #1 assigned; Group A assigned
3	9/6	Thermodynamics: Enthalpy, Heat Capacities, Reactions, Entropy, T-S, Other Types of Cycles	Hwk #1 due in class
4	9/8	Comparing Efficiencies and Cost of Various Energy Supply Options	Hwk #2 assigned; Group B assigned
5	9/13	Review of Fossil Fuel Global Resources and Reserves	Hwk #2 due in class; Group A slides due Wednesday 9/14 5pm
6	9/15	Group Presentations A: Oil, Natural Gas, Coal	Hwk #3 assigned; Group C assigned

7	9/20	Global Climate Change and Carbon Sequestration	Hwk #3 due in class; Group B slides due Wednesday 9/21 5pm
8	9/22	Group Presentations B: CSP and Biomass	Hwk #4 assigned; Group D assigned; Group A reports due in class
9	9/27	The Physics of Radioactivity and Solar Cells	Hwk #4 due in class; Group C slides due Wednesday 9/28 5pm
10	9/29	Group Presentations C: Photovoltaics, Geothermal, Nuclear	Hwk #5 assigned; Group E assigned; Group B reports due in class
11	10/4	Electrical Generators, Life Cycle Assessment	Hwk #5 due in class; Group D slides due Wednesday 10/5 5pm
12	10/6	Group Presentations D: Wind, Ocean/Wave	Hwk #6 assigned; Group C reports due in class
13	10/11	The Electrochemistry of Fuel Cells and Batteries	Hwk #6 due in class; Group E slides due Wednesday 10/12 5pm
14	10/13	Group Presentations E: Electric Vehicles, LNG Vehicles, Biofuels	Group D reports due in class; Group E reports due 9:30 am on 10/20
	TBD 10/20- 22	Final Exam (Open Everything) Location: TBD	