

# Energy and Environment

*Spring 2016*  
*Andrew Bell*

## Description

This course will provide the basic toolkit for students to have an informed discussion on energy systems, and our future energy portfolio. Course material will begin with demand (what forms of energy we use, and how it is embedded into the things we consume) and continue on to supply (principles of energy production, and the energetics + economics of conventional and renewable energy sources). The course will emphasize trade-offs among energy sources of cost, land use, pollution, and climate, and what they imply for new energy development.

Students should expect to make extensive use of spreadsheet tools. In-class work will use Microsoft Excel; Google sheets may also be used but students are responsible for learning differences across the two software programs.

### *Textbooks:*

- Narbel, Hansen, and Lien (2014). Energy Technologies and Economics. Springer. Free online via NYU Libraries → Databases A-Z → S → SpringerLink → (Search)
- MacKay (2008). Sustainable Energy without the hot air. [Free online at www.withouthotair.com](http://www.withouthotair.com)

*Instructor:* Andrew Bell is Assistant Professor of Environmental Studies, with research focusing on coupled natural-human systems.

*Office Hours:* R-F, 9:30am-11:30am. Sign up for a slot in advance at [goo.gl/3ezETN](http://goo.gl/3ezETN)

**\*\*Make sure your Google Apps time zone is correctly set. If office hours appear to be at a different time than written above, your settings are probably wrong\*\***

## Grading and Student Expectations

Item	% of grade
Weekly problem sets	25
Energy Presentation	5
In-class midterm	20
Stakeholder exercise report	15
Final paper topic and abstract	5
Final paper literature review	10
Final paper	20

Assignments and exams will be given a numeric score from 0-100. Late submissions will be penalized 5 points per whole/partial day late.

**It is NYU policy that all work is expected to be your own. Plagiarism of any kind will result in a failing grade for the class, and referral to an academic dean. Plagiarism includes: copying sentences or fragments from any source without quotes or references; not citing every source used in your papers; citing internet information without proper citation; presenting someone else's work as your own; or copying verbatim from any source. You are subject to CAS's guidelines for Academic Integrity:**

<http://cas.nyu.edu/page/ug.academicintegrity>

### *(Nearly) Weekly Problem Sets*

Numerical and short-answer problem sets (~5-10 problems per set) will be posted following Wednesday class online in NYUClasses and be due by the start of the following Wednesday. Submission is via the NYUClasses page.

There will be a total of 8 problem sets over the semester. Your grade will reflect the average of your highest 7 problem set scores.

### *Presentation*

Each student must give a short presentation on one of the lecture topics presented during the semester. Our lecture time will provide an overview of the topic, without time to delve into all details. The purpose of each presentation is to explore a subtopic (perhaps a particular application, a particular analysis, a particular alternative technology or device, or other area of the student's interest) and provide a brief (5-8 minutes) explanation to the class. Presentations should include 6-10 slides and appropriate references for all materials consulted.

The sign-up sheet for presentation slots is at <http://goo.gl/ZsGRzA>

As there are more than 10 students in the class, in some cases two students will make a joint presentation. These presentations should be twice as spectacular as those given by one student. Please do not sign up as a 2<sup>nd</sup> presenter for a slot until all of the 1<sup>st</sup> presenter slots are full.

### *In-class Midterm*

On March 23<sup>rd</sup> there will be an in-class midterm, inclusive of material covered in Problem Sets 1-5

### *Stakeholder Exercise Report*

At the end of April we will integrate what we have learned about energy by holding a multi-stakeholder energy planning exercise, in groups. Group members will be assigned roles and

objectives. This report will be prepared by your group; outlining your experiences, findings, and recommendations from the exercise. Submission will be via the NYUClasses page.

### *Final Paper*

The final paper will be on a topic of the student's choosing and may draw on any or all parts of the course. It may include additional literature review, analytic or empirical content; it may expand on questions raised during the course or pose a new question not addressed in lecture. The paper is to be submitted in 3 stages, with feedback from the instructor that hopefully will improve the final product:

<b>Stage</b>	<b>Due Date</b>	<b>Description</b>
<b>Topic, Question, and Abstract</b>	21-Mar-16	300-500 words (plus references). A clear introduction to the topic, and sufficient background material (with citation) to lead to and articulate the question that the paper will address
<b>Literature Review</b>	18-Apr-16	A minimum of 20 references to support the analysis of the question previously submitted. Source of each reference (academic literature; grey literature from industry, government, or non-governmental source; media, blog or op-ed; etc.) must be clearly identified, and the key messages from the source (as they relate to the topic and question) should be summarized. Either prose or bulleted lists are acceptable for submission, but in either case the submitted literature review should demonstrate a coherent framework for addressing the research question.
<b>Final Paper</b>	16-May-16	3000-5000 words, inclusive of bibliography and in-text citations. A completed final paper that introduces a clear question related to energy, and contributes some kind of analysis (empirical or critical literature review) to contribute to answering it.

All paper stages are to be submitted via NYU Classes.

### *Re-grade Requests*

I am willing to re-visit grades for assignments under very specific conditions. Requests for regrade must:

- Be made no sooner than 24 hours from posting of grade, and no later than 72 hours after posting of grade
- Contain a substantive description of how the originally submitted response merited greater consideration, without adding new or different information to the response
- Be submitted via the Messages function of the NYUClasses page

## Approximate Lecture Schedule

Date	Topic	Reference Chapters	Additional Notes
25-Jan-16	Introduction to Course	-	
27-Jan-16	Basics of Energy	Narbel 1.1 – 1.5	
1-Feb-16	Basics of Energy/ Energy Economics	Narbel 1.6 – 1.8	
3-Feb-16	Basics of Energy Economics	-	Problem Set 1 Posted
8-Feb-16	Energy Demand	MacKay 3, 5, 7, 9, A, C, E	
10-Feb-16	Energy Demand	MacKay 11, 13, 15, 17, H	Problem Set 2 Posted
15-Feb-16	No Class		
17-Feb-16	Energy Supply - Coal	Narbel 2.2, MacKay 23	Presentation - Energy Demand
22-Feb-16	Energy Supply - Oil and Gas	Narbel 2.3 – 2.6	
24-Feb-16	Energy Supply - Non-conventional Fossil	Narbel 2.7	Presentation - Coal Problem Set 3 Posted
29-Feb-16	No class – Video Assignment	-	
2-Mar-16	Energy Supply - Nuclear	Narbel 3, MacKay 24	Presentation - Oil and Gas
7-Mar-16	Analysis - Constrained Optimization I	*See NYUClasses for supplemental readings	Presentation - Non-conventional Fossil Problem Set 4 Posted
9-Mar-16	Analysis - Constrained Optimization II	-	Presentation - Nuclear
14-Mar-16	No Class	-	
16-Mar-16	No Class	-	
21-Mar-16	Energy Supply - Solar	Narbel 4.2, MacKay 6, D	Problem Set 5 Posted
23-Mar-16	In-class Mid-term	-	Problem Set 6 Posted
28-Mar-16	Energy Supply - Wind	Narbel 4.3, MacKay 4, B	Final Paper Topic/Question/Abstract Due
30-Mar-16	Energy Supply - Hydropower	Narbel 4.4, MacKay 8	Presentation - Solar
4-Apr-16	Energy Supply - Biomass	Narbel 4.5, MacKay 6	Presentation - Wind Problem Set 7 Posted
6-Apr-16	Energy Supply - Other Renewables	Narbel 4.6 – 4.7, MacKay 12, 14, 16, 25, F, G	Presentation - Hydropower
11-Apr-16	Case study - Brazil	*See NYUClasses for supplemental readings	Presentation - Biomass Problem Set 8 Posted
13-Apr-16	Energy Constraints - Climate, Supplies, Efficiency	Narbel 5.3, MacKay 22, 26, 31	Presentation - Other Renewables
18-Apr-16	Energy Future - Projected Growth and Future Scenarios	Narbel 5.1, 5.4, MacKay 27, 28, 30	Final Paper Literature Review Due
20-Apr-16	Case study - Pakistan	*See NYUClasses for supplemental readings	
	Energy Future - Portfolio and Policy Instruments	Narbel 5.2	
27-Apr-16	Stakeholder Exercise		
2-May-16	Stakeholder Exercise		
4-May-16	Follow-up from Exercise/Guest Speaker John Bradley (VP Sustainability)		
9-May-16	NYU Cogen Plant Visit		
11-May-16			Stakeholder Exercise Report Due
16-May-16			Final Paper Due