EMSE 6260: Energy Management
Course Syllabus

Spring 2011
Tuesdays, 6:10 pm – 8:40 pm
Tompkins Hall, Room 201 (725 23rd St, N.W.)
E&EM web page: http://www.gwu.edu/~eem
E&EM newsletter: http://www.gwu.edu/~eemnews

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COURSE DESCRIPTION

- Topics to be Covered
  o Energy Patterns and Trends
  o Energy Fundamentals
  o Buildings and Energy
  o Sustainable Electricity
  o Sustainable Transportation and Land Use
  o Energy Policy and Planning
- Course will get you thinking on questions such as:
  o Can we use energy and its concepts to understand what is happening to our economy?
  o Can we achieve sustainability at our present rate of consumption of natural resources?
  o Can carbon taxes or tradable permits reduce our production levels of carbon dioxide?
  o How serious are the health effects and risk of energy related effects like global climate change and urban air pollution?
  o How can we design our buildings to consume less energy?
  o Can we continue to use cars for transportation?

*There will be no exams.* It is time to develop other skills and the one we will focus on is your creativity and ability to think for yourself. The main objective is for you to fully comprehend the technical, environmental, policy, etc. issues related to our use of energy and the development of sustainability. You will be digging into a topic of interest to you through a research project, while also working out the needs concerning an energy policy for yourselves. Additionally, you will be providing “perspectives” on issues covered in previous classes. *All assignments are directed towards enhancing your creativity and enabling you to consider all aspects of an issue.*

Grading will involve the *originality and usefulness* of your deliverables to the class. To get an A you will have to do something extra. This is where you can use your creativity. A general idea is that an A will result from your providing new and useful material for this course. The grade of B is reserved for a professional job.
GRADING

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Reflections</td>
<td>10%</td>
</tr>
<tr>
<td>Research Project</td>
<td>50%</td>
</tr>
<tr>
<td><em>(short presentation plus paper)</em></td>
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<tr>
<td>Energy Policy Paper</td>
<td>30%</td>
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<tr>
<td>Class participation</td>
<td>10%</td>
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REQUIRED TEXT

**Energy for Sustainability: Technology, Planning, Policy**
Authors: John Randolph and Gilbert M. Masters
Publisher: Island Press; 1 edition (June 22, 2008)
ISBN-10: 1597261033

ADDITIONAL SUGGESTED READING

**Our Energy Future: Resources, Alternatives, and the Environment**
Authors: Christian Ngo and Joseph Natowitz
Publisher: Wiley (September 15, 2009)
ISBN-10: 0470116609

**Energy and Climate Change: Creating a Sustainable Future**
Author: David Coley
Publisher: Wiley (June 30, 2008)
ISBN-10: 0470853131

Author: Roy L. Nersesian
Publisher: M.E.Sharpe; 2nd edition (March 30, 2010)
ISBN-10: 0765624125

**Alternative Energy: Political, Economical, Social Feasibility**
Author: Christopher A. Simon
ISBN-10: 0742549097

**Integration of Alternative Sources of Energy**
Authors: Felix A. Farret and M. Godoy Simões
ISBN-10: 0471712329
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Jan 11</td>
<td>Energy Patterns and Trends</td>
</tr>
<tr>
<td>Jan 18</td>
<td>Energy Futures &amp; Fundamentals of Energy Science</td>
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<tr>
<td>Jan 25</td>
<td>Fundamentals of Energy Science (continued) &amp; Energy Analysis</td>
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<tr>
<td>Feb  1</td>
<td>Energy Efficiency for Buildings &amp; Solar Energy for Buildings</td>
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<tr>
<td>Feb  8</td>
<td>Solar Energy for Buildings (continued) &amp; Whole Building/Whole Community Energy</td>
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<tr>
<td>Feb 15</td>
<td>Central Electric Power Systems &amp; Distributed Energy Resources</td>
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<tr>
<td>Feb 22</td>
<td>Solar PV Systems</td>
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<tr>
<td>March 1</td>
<td>Large-scale Renewables: Wind and Solar</td>
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<td>March 8</td>
<td>Transportation Energy and Efficient Vehicles</td>
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<td><strong>Spring Break: March 14-18</strong></td>
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<tr>
<td>March 22</td>
<td>Biofuels, Biomass, and Other Alternative Fuels</td>
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<tr>
<td>March 29</td>
<td>Whole Community Energy and Land Use</td>
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<td>April 5</td>
<td>Market Transformation to Sustainable Energy</td>
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<tr>
<td>April 12</td>
<td>Energy Policy</td>
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<tr>
<td>April 19</td>
<td>U.S. State and Community Energy Policy and Planning</td>
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ASSIGNMENTS

There are three different types of assignments involved in this course, which, along with your class participation, will make-up your grade for this course:

1. **Reflections or Critiques:** These should be **one or two pages long** involving your thoughts about some aspect of the lecture the preceding week(s). You can research some particular aspect, follow up on a thought you have about a new aspect, etc. Different views and new and different material is sought here. References are encouraged and if of obscure and not well known sources the bias should be discussed.

2. **Research Project:** Paper and presentation. This is a **max 20 page standard paper** on any topic you choose (related to energy management) and a **max 5 minute presentation** (on insights you have gained through your research).

3. **Energy Policy Paper:** It must be self-consistent, understandable and clear. The guiding principle or philosophy must also be clear and easily testable. It must be clear to all what the goals are.

**Important Note:** For Internet sources that whose bias is not clear (other than EPA, EIA, RFF, RMI, Sierra Club and similar sources) you will include an ANNOTATED list of references. These references will include at least two primary references (and these need to be clearly marked in your annotations). These primary references include books or journal articles - you can locate these materials in a library and are encouraged to seek the help of the reference librarian. Wikipedia and other tertiary and lower references will not be acceptable. When you use references that are not peer-reviewed, you need to be the peer-reviewer. This, primarily, means the web sites. You are expected to include in your submissions annotations - a sentence or two that result from your peer review.

**Research Project**

A significant part of the course will entail the development of a research project dealing with energy management-related issues. Project deliverables will consist of the following:

1. **Short Project Proposal:** Due Jan. 25. 1-2 page maximum written document. It is to contain, at a minimum (two-page maximum length, however) the following elements:
   - Statement of the problem/case study:
     - What is it?
     - Why is it of interest?
   - Description of the project:
     - What is proposed to be done?
     - What sources do you anticipate using?
   - Identification of project tasks.
   - Schedule of project tasks and work assignments.

2. **A brief (5 minute) oral presentation on key insights gained (March 1 - April 12):** You will give a short presentation about what you learned from your project – highlights of key things you discovered. These presentations **will strictly be limited to 5 minutes**. The idea is to share one or two aspects with your classmates that you learned from your work. Please bring a handout for the class (1-2 pages).

3. **A (maximum 20 page) written final project report.** Due last day of class (April 19).

You will be graded on the paper and the presentation separately - you will get one grade for the project which is an amalgam of the two grades.
Research projects may be developed in one of four categories:

1. **Case Studies**: Case studies may involve investigations into specific energy management issues, such as methods for generating electricity, global climate, transportation, resources, etc.

2. **Analytical Investigations**: Projects in this category can focus on the analysis of major topics in the areas of technology, law or policy as related to energy management. Examples include economic analyses, resource availability and sustainability; inquiries into recent developments in energy-saving technologies; investigations into the results of recent applications of relatively new technologies; etc.

3. **Current Issues**: Projects in this category would focus on current developing issues. For example, such projects could investigate recent developments energy use trends; development and deployment of renewable energy technologies; major active laws and policies such as carbon tax and other similar taxes; cost of energy; geopolitics; etc.

4. **Miscellaneous**: Since the purpose of this project is to stimulate creativity and not to artificially restrict the range of acceptable topics, any other current, relevant or appropriate topic related to a major subject involving energy management may be acceptable.

**Energy Policy Paper**

You will submit an energy policy the last day of this class. It should be **ten pages maximum plus one to two pages of references** (one primary and one recent one for each option and element). If you hail from another country you can develop a policy for that country. The policy must have two characteristics. First, there must be an overarching theme, organizing principle or way to determine if the elements of the policy are self-consistent and directed in a supportive way, second, there must be criteria to test and determine if the policy has been carried out. The policy should include components such as:

- Philosophy, goals, and elements.
- Rationale.
- Next Steps.
- Timeline (short term and long term).
- Range from global (globalization and geopolitics) to U.S. (regional/local/personal).
- Themes (complexity, technology, market vs. regulation, and externalities).
- Discussion and Conclusions - Will it work?

**SCHEDULE OF ASSIGNMENTS**

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<th>Date</th>
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<td>Reflections &amp; Short Project Proposals</td>
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<td>Feb 1</td>
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<td>Reflections</td>
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</tbody>
</table>
March 1  Reflections & Student Presentations
March 8  Reflections & Student Presentations

*Spring Break: March 14-18*

March 22 Reflections & Student Presentations
March 29 Reflections & Student Presentations
April 5  Reflections & Student Presentations
April 12 Reflections & Student Presentations
April 19 Final Research Paper & Energy Policy Paper Due

Grades for all deliverables will be based on criteria such as substance and relevance, logic and unity, clarity, syntax and grammar, and appearance. In addition, failure to comply with maximum length specifications will subject deliverables to reductions in grade.

Regarding formats for written reports, there are many published guidelines on technical report writing. Any standard format can be used for the written reports. One widely accepted such guideline, which is available in the Gelman Library, is *A Manual for Writers of Term Papers, Theses and Dissertations* by Kate L. Turabian, University of Chicago Press, 1989.