Integrated Energy Challenges and Opportunities
Course Number: 16:137:556

Syllabus, Fall Term, 2014

Credits: 3
Format: Lecture/Seminar
Schedule: Thursdays, 6:40-9:30 pm
Location: Tillet Hall, Room 209, Livingston Campus
(53 Avenue E Piscataway, NJ 08854-8040);
http://rumaps.rutgers.edu/location/tillett-hall

Course Description:
Challenges and opportunities related to society’s demand for energy and the resulting environmental impact, from the perspective of physical, biological social sciences, and engineering.
Lectures by faculty/guest experts, with related student discussions, presentations, and team-based projects.
See below for tentative class schedule and more information about assignments.

Instructor/course convener: Dr. Linda Anthony (lanthony@rci.rutgers.edu)

Prerequisites/Registration:**
Open to all graduate and “4+1” students currently pursuing energy and sustainability related research, broadly defined.
Strongly recommended for students in Sustainability track in Masters of Business in Science/Professional Science Master’s Program; also highly relevant to many students in Biotechnology/Genomics, Engineering Management, Urban Environmental Analysis & Mgmt, tracks.
Space permitting, also open to advanced undergraduates in relevant fields.
Counts as a class towards the Rutgers Certificate in Energy.

**Special permission number required to register if not in MBS/PSM program
http://mbs.rutgers.edu/academics/special-permission-numbers-request.

Class structure:
Lecture/presentation by faculty or guest expert
Questions and discussion with faculty/guest presenter
Brief break
Student presentation(s) as introduction to topic of next week’s faculty/expert lecture/presentation
Questions and discussion; (and in-class time for students to work on group assignments)

**Class schedule:** (tentative/in-process, last updated August 15, 2014)

<table>
<thead>
<tr>
<th>Date</th>
<th>Presenter</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Sept 4</td>
<td>Linda Anthony</td>
<td>Course overview; course management</td>
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<td></td>
<td>Alan Goldman</td>
<td>Energy, Climate Change, and Sustainability</td>
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<td>Sept 11</td>
<td>Frank Felder</td>
<td>Systems Thinking: Energy Systems and “the Grid”</td>
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<td>Sept 18</td>
<td>Alan Goldman</td>
<td>Introduction to Renewable and Sustainable (Bio) Fuels/Energy</td>
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*Class schedule continues, next page*

Note; as of 15 Aug 15:
Topics/speakers above are already confirmed for Fall 2014
Specific schedule of topics/speakers through Dec 4 is still being arranged.

List below is a representative sampling of prior years’ speakers and new sources for this year, from which exact schedule is currently being finalized.

<table>
<thead>
<tr>
<th>Date</th>
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<th>Topic</th>
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<tbody>
<tr>
<td>Sept 25</td>
<td>Joseph Seneca: <em>Introduction to Energy Economics and Policy</em></td>
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<td>Oct 2</td>
<td>Donna Fennell/Serpal Guran/Peggy Brennan: <em>Biomass/Waste to Energy: Anaerobic Degradation NJ Biomass Potential</em></td>
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<td>Oct 9</td>
<td>Speakers from NJ Start-Ups Clean Energy Innovation: “Value Added”</td>
<td>Opportunities for Profitability Case Studies in Algal Biofuels and Syn-Fuels</td>
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<td>Oct 16</td>
<td>Ying Fan Reinfelder,:Greg Seroka: <em>Energy Sustainability Wind Energy &amp; CO2 Sequestration Off the NJ Coast</em></td>
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<td>Nov 6</td>
<td>Dunbar Birnie and/or industry persons: <em>Solar Energy: Present status and Future Prospects</em></td>
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<td>Nov 13</td>
<td>Charles Dismukes/Andrew</td>
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<td>Nov 20</td>
<td>Bocarsley: <em>Future Solar Fuels from Artificial Photosynthesis</em></td>
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<td><strong>Nov 25(Tues</strong>)</td>
<td>Michael Muller and/or PSEG/ persons: <em>Energy Storage &amp; Transmission; Power Plants</em></td>
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<td>Dec 4 – Last Class</td>
<td>Thu Nguyen: <em>Parasol: Green Energy for Large Data Centers</em></td>
<td>Power Plants</td>
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<td>Clinton Andrews/Uta Krogman: <em>Green Buildings, “Smart” Systems; Life Cycle Analyses</em></td>
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<td>Warren Powel (PR) or RU speaker: <em>Decisions in the Face of Uncertainty: Modeling and Optimization for Engineering/Financial Management</em></td>
<td>Possibility of real and/or virtual tours/talks by Guran/Specca at Eco-Complex and Komitas et al of RU co-gen, solar, geothermal projects</td>
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Dec 11   | Class Projects/Final Exam – part 1                            |                                                                     |
**Thursday schedule on Tuesday because of Thanksgiving recess**

## Assignments:

1. **Weekly written questions/reactions:**
   Before each faculty presentation, relevant reading materials are assigned, typically (i) a major review article and/or something from a respected lay source (e.g. *Scientific American*), and (ii) paper(s) from the primary literature.

   Based on these materials, all students are required to formulate and submit (electronically) at least 2 and not more than 4 questions/reactions. These may be not only requests for clarification of assertions, data, results but also ideas or suggestions for a technical, commercial, or policy innovations, or a challenge to the ideas presented in the readings. Each question should be clearly and succinctly written and not more than about 200 words long. They will be shared in advance with the upcoming presenter, and students will also be encouraged to raise them during class discussions. Instructions for submitting assignments will be posted on the class sakai site.

2. **Peer tutorials:**
   In small groups, students take turns preparing and presenting an introduction to the next week’s class topic, to help prepare their classmates for that lecture. Typically, these will begin 3 or 4 weeks into the semester, after several introductory/overview lectures.

   Students (i) prepare a presentation (.ppt or equivalent, complete with cited references, url’s and other explanations in the “notes” sections of slides), (ii) present it in class and answer questions, and (iii) update it to incorporate any clarifications or additional materials based on class discussion and then upload to the sakai website for the course.

   Each group member contributes to the slides, presentation, and annotated upload. Presentations are typically about 15-20 minutes long with an approx. equivalent number of slides.

3. **Integrative Course Projects (Final Exam):**
   This will be a team-based exercise. Students will investigate the technical and business opportunities/challenges of a sustainable energy technology that (i) is relevant to team members’ academic and career interests, and (ii) currently has or is striving to have a business presence in NJ (for example, producing biodiesel in addition to neutraceuticals from algae).

   Teams will be formed by a combination of student self-assembly and instructor facilitation. Likewise, the energy technologies/businesses will be identified primarily by student input but with instructor assistance as needed. This will occur after the first several weeks of introductory presentations, during which time students will also have a chance to get to know each other better.

   Teams can choose to approach the project from either of 2 contexts: (i) as a company or start up seeking to “pitch” to a regulatory or economic development agency, an angel investor, or a venture capital source about their technology and what they need to establish/expand their business; (ii) as a state, county, or local economic development entity trying to promote more clean energy businesses coming to their area, i.e. seeking to “pitch” to businesses in that energy technology to make it attractive to locate/expand operations.

   To add to the educational value, appropriate faculty and outside subject matter experts will serve as panelists to ask questions to the pitching teams.
Grades will be determined ½ by the course instructor and panel members and ½ by input from the class members not on the team, who will be supplied with an appropriate grading rubric.

**Grading:**

a) Weekly written assignments (reactions/questions on assigned reading): 40%

b) Class presentation (“tutorial” for peers): 20%

c) Final Project: 30%

d) Class Participation: 10%

**Final Project grade will be based ½ on instructor grading and ½ on peer grading**

**Expectations**

Students will be well prepared for all classes, which means:

(i) Completing the assigned readings and submitting written responses on time*

(ii) Being attentive during class presentations; coming prepared ask questions and participate in discussions

Students will also be proactive to bring to the Instructor any questions, concerns, confusions about (i) course content and/or (ii) or course policies, deadlines, etc.

Active communication is the key to overcoming any hurdles you may encounter during the term.

**Extenuating Circumstances:**

If you have extenuating circumstances that prevent you from completing assignments or participating in the class, it is your responsibility to contact the instructor to make alternative arrangements. **In general, requests must be made in advance**, and the possibility of alternative arrangements is at the discretion of the instructor.

**Late Work Policy:**

It is a firm policy that no projects will be accepted after the deadlines mentioned in curriculum. If there are extenuating circumstances, then the course instructor’s permission has to be explicitly requested as noted above.

Please note: It is far better to submit the weekly written assignments for this course a bit late rather than not to submit them at all. Habitually late assignments will not be tolerated, but a truly extenuating circumstance, together with timely notification/explanation and prompt (albeit late) submission might be excused or only modestly penalized.

**Special Needs/Accommodations:**

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in
an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines.
If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

Plagiarism/Academic Dishonesty Policy:
All students are expected to understand and follow the Rutgers University codes of conduct and academic integrity. See: http://studentconduct.rutgers.edu/

Academic Dishonesty includes the following:
1. Submitting work done by another in whole or part
2. Failing to acknowledge source material in an assignment***

*** Special note re: slides for presentations, including final exam/project:
Citations (e.g. url's or bibliographic references) should be provided for images/information (e.g. data tables, charts, photos and graphics, etc.,) in all cases where that information is not either (i) your own work or (ii) already clearly in the public domain. The instructor will expand on this requirement and provide examples in the first class meeting and will post them on sakai.

There is zero tolerance for plagiarism in the course. This means you are not to copy any sentences or phrases from your references. Material should be paraphrased in your own words and cited appropriately. Plagiarism checks of your written assignments will be made using various tools.