LA 459/559 Sustainable Energy Landscapes

*For LA students, this course counts as a Technical Workshop, regular LA elective or Area of Concentration requirement.

CRN: 26874 (undergrad); 26875 (grad), 2 credits
Lawrence 231 on Thursdays 10:00 am -- 11:50 am, Winter 2019
Instructor: Yekang Ko (yekangko@uoregon.edu)
Office hours: Thursday 12:30 pm-2:30 pm or By appointment at Lawrence 213

*This syllabus is a revision in progress and some descriptions may change before the winter term begins.

This course explores sustainable energy landscapes that reduce energy consumption and increase renewable energy generation from site to regional scales. Due to more amplified urban heat islands effects and frequent heat waves, our communities urgently need to find ways to cool down to protect vulnerable lives. Additionally, in order to mitigate climate change, communities are seeking ways to reduce their energy consumption and to sustainably meet their energy demand through renewable energy sources.

Rapid energy transition from fossil fuels to renewables brings about new opportunities and challenges in urban, rural and wild landscapes. In the past decade, decentralized energy systems (e.g. rooftop solar photovoltaics) has been skyrocketing in urban areas. Utility-scale renewable energy facilities (e.g. solar and wind farms) have also been rapidly spreading in rural and remote areas. Utility-scale renewable energy, despite their contribution to combating climate change, has been controversial because of their environmental and social impacts on ecosystems, human health and cultural landscapes.

In various complex challenges we face, this seminar seeks to answer how we can design and plan energy landscapes to meet our energy needs while addressing local extreme weather events and global climate change. The class will explore various case studies around the world. For interdisciplinary learning, students from all disciplines are more than welcome.

**Learning objectives**

At the end of this course, you should be able to:

- Identify key principles of sustainable energy generation and consumption and their spatial implications
- Articulate opportunities and challenges of utility-scale and decentralized renewable energy generation
- Acquire an evidence-based design approach to reduce energy consumption and increase on-site renewable energy generation in urban areas
- Develop innovative design and strategic planning strategies for sustainable and resilient energy systems
**Required textbook**

Required readings draw upon a range of sources and disciplines (see the reading sources). They will be available either on Canvas in PDF format or online.

Recommended textbooks are:


**Course format, assignments and grading**

This seminar combines lectures, discussion, student presentations, and collaborative team work for the final project. Students are required to complete all assigned readings PRIOR to the class meeting in which they are listed on the schedule. Grades will reflect class preparation and participation (40%), a case study investigation (10%, graduate students only) and a final group project (50% for graduate students and 60% for undergraduate students). In 400/500 level courses, the university requires that graduate students fulfill requirements beyond those of undergraduates. To this end, graduate students will be asked to read more materials, to present a case study, and to exercise leadership in team projects. The student engagement inventory that includes assignments and hours engaged for each activity is available in the appendix.

Students are expected to keep track of their performance throughout the term and seek guidance if their performance drops below satisfactory levels. More detailed guidelines and expectations follow:

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Evaluation</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Preparation &amp; Participation (55%)</td>
<td>Attendance (3 pts each for nine classes)</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Class participation in discussion (low to high)</td>
<td>10</td>
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<tr>
<td></td>
<td>Response papers – one page (3 pts each for six papers)</td>
<td>18</td>
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<tr>
<td>Case study Investigation (15%)</td>
<td>Case study presentation</td>
<td>15</td>
</tr>
<tr>
<td>Final project</td>
<td>Final Presentation</td>
<td>30</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>100</strong></td>
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</table>

There will NOT be a curve. Final letter grades for the course will be assigned as follows:

- A* ≥ 97%
- A ≥ 93%
- A' ≥ 90%
- B* ≥ 87%
- B ≥ 83%
- B' ≥ 80%
- C* ≥ 77%
- C ≥ 73%
- C' ≥ 70%
- D* ≥ 67%
- D ≥ 63%
- D' ≥ 60%
- F < 60%

* The course is offered as either graded or pass/no pass. In either case, all assignments must be completed satisfactorily and submitted in a timely fashion to achieve a passing grade.

- **Class Preparation & Participation**: Students are expected to attend class on time, contribute to discussions, and consistently demonstrate that they have completed the readings. For each class, students are expected to submit a one-page response to the weekly assigned reading materials to Canvas by no later than 6pm on Sunday (total six
essays). The essay is for students to prepare for each class and engage with active discussion. Graduate students are assigned additional readings, as noted as “G” in the course schedule. Undergraduate students are encouraged to read these additional sources, but it is not required to fulfill course requirements.

- **Case Study Investigation**: Each graduate student selects one of the following topics to make a 10-minute oral presentation on a best practice of innovative energy-conscious site design. Prof. Ko will provide students with a specific guidance to determine the case study. Each case study must include: renewable energy type, project sites (including land/water area), system size (energy capacity), stakeholders involved, project planning process (timeline), design layout, unique design features, energy performance, controversies (if any), critiques and potential design improvements. Graphic communications (maps, figures, charts, etc.) are highly recommended. Rubrics for evaluating the presentation will be available on Canvas.

  Cast study topics and examples are:
  - Agrophotovoltaics – PVs with livestock, crops, aquaculture etc.
  - Floatovoltaics – PVs on reservoirs, water canals etc.
  - Co-location of utility-scale renewable energy (e.g. solar + wind)
  - Renewable energy on existing infrastructures (e.g. noise barriers, highways, dams etc.)
  - Reclaiming brownfields for renewable energy production
  - Energy-integrated community design (passive and active solar, energy-conserving landscaping, energy-water-waste integration)
  - Innovative design of distributed solar energy generation in buildings and built environments
  - Resilient energy systems

- **Final Project – TBA**

### Course schedule

<table>
<thead>
<tr>
<th>Class</th>
<th>Reading Assignment</th>
<th>Assignment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1 <strong>Course Overview: Sustainable Energy Landscapes</strong></td>
<td></td>
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<tr>
<td><strong>Introduction and case study group formation (graduate students only)</strong></td>
<td>No reading</td>
<td></td>
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<tr>
<td>W2 <strong>Utility-scale renewable energy design for landscape conservation</strong></td>
<td>Apostol et al., 2017a; Apostol et al., 2017b; Pasqualetti and Stremke, 2017 (G)</td>
<td>Reading Response 1</td>
</tr>
<tr>
<td>W3</td>
<td>Utility-scale renewable energy planning for resolving Conflicts of Greens</td>
<td>Gasparatos et al., 2017; The Nature Conservancy; DRECP Independent Science Advisors, 2010; Pearce et al. 2016 (G)</td>
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<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>W4</td>
<td>Water-energy nexus: Oregon best practices</td>
<td>TBA</td>
</tr>
<tr>
<td>W5</td>
<td>Case study presentations and Design Exercise</td>
<td>No reading</td>
</tr>
<tr>
<td>W6</td>
<td>Decentralized energy systems: urban solar energy designs and planning</td>
<td>APA, 2013; Staley, 2015; TBA; Adill and Ko, 2016 (G)</td>
</tr>
<tr>
<td>W7</td>
<td>Microclimate and passive heating and cooling</td>
<td>ASLA; Ko, 2013; Stremke and Koh, 2010; TBA</td>
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<tr>
<td>W8</td>
<td>Resilient energy landscapes</td>
<td>Malashenkon, 2018; New York Power Authority, 2017; Spies et al., 2018; USDA Forest Service</td>
</tr>
<tr>
<td>W9</td>
<td>Case study presentations and Preliminary design desk crits</td>
<td>No reading</td>
</tr>
<tr>
<td>W10</td>
<td>Final Review Week – No Class</td>
<td>Final presentation file submitted to Canvas</td>
</tr>
<tr>
<td>W11</td>
<td>Final Presentation and Final Submission</td>
<td>Final presentation file submitted to Canvas</td>
</tr>
</tbody>
</table>

* G indicates “required for graduate students only and recommended for undergraduate students.

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.

**Reading Sources**

*Utility scale renewable energy*


The Nature Conservancy Energy Sprawl
https://global.nature.org/initiatives/energy-sprawl/about-energy-sprawl


**Decentralized energy systems**


**Energy-conserving landscapes**
ASLA Sustainable Residential Design: Increasing Energy Efficiency
https://www.asla.org/energyefficiency.aspx


TBA

**Resilient energy landscapes**


https://www.ecologyandsociety.org/vol23/iss2/art11/

Information for Students with Disabilities
The University of Oregon is working to create inclusive learning environments. If there are learning or health considerations that may affect your ability to participate fully in this course, please meet with Prof. Ko as soon as possible to discuss possible accommodations. If this is a documented disability, please request that the Counselor for Students with Disabilities send a letter of verification. You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Policy Statement on Academic Honesty and Student Conduct
All work submitted must be your own (or your team’s) and originally produced for this course. The use of sources (ideas, quotations, paraphrases) must be properly acknowledged and documented. Students are encouraged to work together and assist one another, but unless an assignment is specifically designated as a team project, each student is expected to complete their own work individually. Plagiarism means using the ideas or writings of another as one’s own. It includes, but is not limited to (a) the use, by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgement and (b) the unacknowledged use of materials prepared by another person.

Academic Misconduct
The University Student Conduct Code (available at conduct.uoregon.edu) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students’ obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at researchguides.uoregon.edu/citing-plagiarism.
### Appendix. Student Engagement Inventory

<table>
<thead>
<tr>
<th>Educational activity</th>
<th>Hours Undergrad student engaged</th>
<th>Hours Graduate students engaged</th>
<th>Explanatory comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course attendance</td>
<td>18</td>
<td>18</td>
<td>2 hr per week x 9</td>
</tr>
<tr>
<td>Assigned readings</td>
<td>18</td>
<td>24</td>
<td>3 (4) hr per week x 6</td>
</tr>
<tr>
<td>Project</td>
<td>15</td>
<td>20</td>
<td>3 (4) hr per week x 5</td>
</tr>
<tr>
<td>Writing assignments</td>
<td>6</td>
<td>6</td>
<td>1 hr for a reading response paper x 6</td>
</tr>
<tr>
<td>Performance/creative activities</td>
<td>N/A</td>
<td>8</td>
<td>(0) 8 hr preparation for a 10-min case study presentation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>3 (4) hr preparation for the final project report</td>
</tr>
<tr>
<td><strong>Total hours:</strong></td>
<td><strong>60</strong></td>
<td><strong>80</strong></td>
<td></td>
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