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: 36307 (undergrad); 36311 (grad), 2 credits
Lawrence 231 on Mondays 10:00 am -- 11:50 am, Spring 2018
Instructor: Yekang Ko (yekangko@uoregon.edu)
Office hours: Tuesday 1pm-3pm or By appointment at Lawrence 213



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

This seminar 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 not sacrificing social and ecological values***. The class will explore various case studies around the world. Guest lectures will allow students to hear from experts on specific topics. Students will conduct an in-depth mixed-use solar design project that aims to resolve an on-going conflict between solar development and endangered bird habitats in Taiwan. Design skills are welcome but not required. 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 strategic planning strategies for a least-conflicting solution for renewable energy generation incorporating social, cultural and ecological values of the site

Required textbook

Readings draw upon a range of sources and disciplines. They will be available either on Canvas in PDF format or online.

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 (20%) and a final group project (40%). 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 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:

Requirements	Evaluation	Weight (%)
Class Preparation & Participation (40%)	Attendance (2 points each for nine classes)	18
	Class participation in discussion	4
	Response papers (3 points each for six papers)	18
Case study Investigation (20%)	Case study presentation	20
Final Design Project (40%)	Preliminary design review	10
	Final Presentation	15
	Final Report	15
TOTAL		100

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

$A^+ \geq 97\%$ $A \geq 93\%$ $A^- \geq 90\%$

$B^+ \geq 87\%$ $B \geq 83\%$ $B^- \geq 80\%$

$C^+ \geq 77\%$ $C \geq 73\%$ $C^- \geq 70\%$

$D^+ \geq 67\%$ $D \geq 63\%$ $D^- \geq 60\%$

$F < 60\%$

* 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 response to the 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 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**: A pair of students will form a team and select one of the following topics to make a 10-minute oral presentation on a best practice of innovative energy-conscious site design. Students must consult with Prof. Ko to determine the case study at least a week prior to the presentation date. The presentation must include in-depth investigation on the case study such as: a brief background of the project, key stakeholders involved, key design elements, challenges and controversies during the implementation process (if any), major contributions to sustainability, critique, and bibliography. Graphic communications (maps, figures, charts, etc.) are highly recommended. Rubrics for evaluating the presentation will be available on Canvas.

  Cast study topics/examples are:
  - Integrated energy systems in community design (passive and active solar, energy-conserving landscaping, energy-water-waste integration)
  - Innovative design of distributed energy systems in buildings and built environments
  - Innovative design of utility-scale solar and wind energy that maximizes energy output and reduces ecological impacts with minimal footprints
  - Co-location of utility-scale renewable energy (e.g. solar + wind)
  - Reclaiming brownfields for renewable energy production

- **Design Group Project:** Throughout the spring term, each team will pick a site in Taiwan, evaluate the current conflicts between solar energy development and endangered bird habitats and develop a mixed-use solar development design proposal. More details of the project and evaluation rubrics will be available on Canvas. The evaluation of the project will be based on: a preliminary design review, a 15-minute final presentation, and a final report (a final presentation file incorporating reviewers' feedback). Graphic communications such as maps, figures, charts, photographs, etc., are highly recommended in the presentations and report.
  - Preliminary design review (May 21): 10-minute progress desk crit (10 points)
  - Final Presentation (May 28): 15-minute final project presentation (15 points)
  - Final Report /Deliverables (June 11): Incorporating the reviewers' feedback on the final presentation, each group must submit their completed project report (15 points).

Course schedule (Draft)

	Class	Reading Assignment	Assignment Due
W1 4/2	**Course Overview: Sustainable Energy Landscapes** Introduction and group formation	TBA	
W2 4/9	**Utility-scale renewable energy 1:** Final design project announcement	TBA	Reading Response 1
W3 4/16	**Utility-scale renewable energy 2:**	TBA	Reading Response 2
W4 4/23	**Decentralized energy systems 1**	TBA	Reading Response 3 Case study 1 and 2
W5 4/30	**Decentralized energy systems 2**	TBA	Reading Response 4 Case study 3 and4
W 6 5/7	**Energy conserving landscapes**	TBA	Reading Response 5 Case study 5 and 6
W7 5/14	**Synthesis**	TBA	Reading Response 6 Case study 7 and 8
W8 5/21	**Preliminary design review**		Case study 7 and 8 Draft design
W9 5/28	**Final Presentation**		Presentation
W10 6/4	Final Review Week – No Class		
W 11 6/11	**Final Deliverable Submission**		Final presentation file submitted to Canvas

**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 (In progress)

Sustainable Energy Landscapes

Apostol, D. Palmer, J. Pasqualetti, M., Smardon, R. and Sullivan, R., 2017. Introduction to the changing landscapes of renewable energy in *Renewable Energy Landscapes*. Routledge: London and New York

Pasqualetti, M. and Stremke, S., 2017. Energy Landscapes in a crowded world: A first typology of origins and expressions. *Energy Research & Social Science*

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

Utility scale renewable energy

Apostol, D., McCarty, J. and Sullivan, R., 2017. Improving the visual fit of renewable energy projects (Chapter 7) in *Renewable Energy Landscapes*. Routledge: London and New York

Hernandez, R.R. et al., 2014. Environmental impacts of utility-scale solar energy. *Renewable and Sustainable Energy Reviews*, 29, pp.766–779.

Mulvaney, D., 2017. Identifying the Roots of Green Civil War over Utility-Scale Solar Energy Projects on Public Lands across the American Southwest. *Journal of Land Use Science* 12(6), pp. 493–515.

Pearce, D., Strittholt, J., Watt, T., & Elkind, E.N., 2016. *A Path Forward: Identifying Least-Conflict Solar PV Development in California's San Joaquin Valley*. Center for Energy, Law and the Environment at the University of California at Berkeley and Conservation Biology Institute.

The DRECP Independent Science Advisors, 2010. *Recommendations of Independent Science Advisors for The California Desert Renewable Energy Conservation Plan (DRECP)*, Conservation Biology Institute.

Decentralized energy systems

Adil, A. M.*and Ko, Y. 2016. Socio-technical evolution of Decentralized Energy Systems: A critical review and implications for urban planning and policy, *Renewable and Sustainable Energy Reviews* 57: 1025–1037.

American Planning Association. 2013. *Balancing Solar Energy Use with Potential Competing Interests*, Solar Briefing Papers 5

Energy-conserving landscapes

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

Reed, S. 2010. *Energy-wise Landscape Design: A New Approach for your Home and Garden*. New Society Publishers

Ko, Y. 2013. Urban form and residential energy use: A review of design principles and research findings. *Journal of Planning Literature* 28(4): 327-351.

Stremke, S. and Koh, J. 2010. Ecological concepts and strategies with relevance to energy-conscious spatial planning and design. *Environment and Planning* B 37: 518-532

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

Educational activity	**Hours Undergrad student engaged**	**Hours Graduate students engaged**	**Explanatory comments**
Course attendance	18	18	2 hr per week x 9
Assigned readings	9	18	1.5 (3) hr per week x 6
Project	16	24	2 (3) hr per week x 8
Writing assignments	6	6	1 hr for a reading response paper x 6
Performance/creative activities	4	5	8 hr preparation for a 10-min case study presentation
	2	3	6 (8) hr preparation for a 10-min preliminary draft review
	3	4	8 (12) hr preparation for a 15-min group presentation
	3	4	8 (12) hr preparation for the final project report
Total hours:	**61**	**82**	