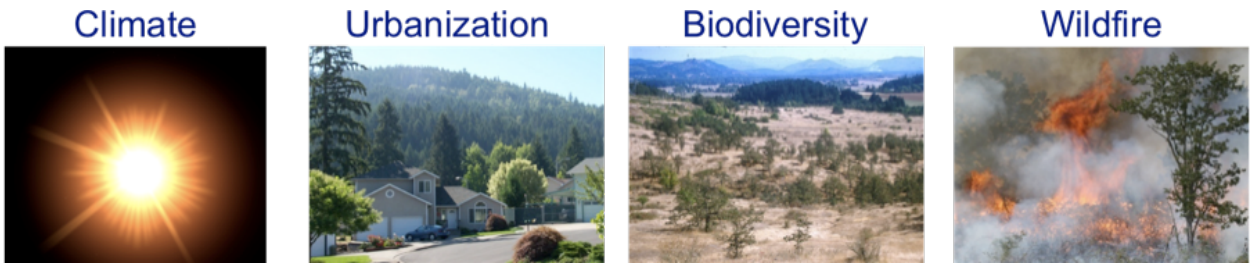
LA 465/565 Advanced Landscape Ecology
Climate Change Adaptation Planning

Department of Landscape Architecture • University of Oregon • Winter 2014
4 credits • Grading P/NP • Prerequisite: LA 441/541 or Instructor Permission
Time: Tu/Th 12:00-1:50 PM • Location: 231 Lawrence Hall • CRN 28471/28472



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What?

Explore how climate change, ecosystems and people interact in coupled human and natural systems to create the landscapes of the future

Gain firsthand experience with emerging simulation technologies being used by planners and scientists to help citizens and decision makers chart new courses of action

Learn how to proactively strategize ways to anticipate future hazards and to catalyze societal adaptation to global environmental change at local landscape scales

Why? Where? How?

One of the great challenges facing society in the 21st century is that people must craft and implement adaptive responses to climate and population change for which there is little, and in some cases no, historical precedent. To effectively adapt to climate and population change, we must anticipate future hazards, catalyze adaptive behaviors, and do so in ways that are robust to the inherent uncertainties of evolving threats, tipping points, and extreme events such as wildfires, storms and floods.

Because of the complex interactions among human and natural systems, both public and private sectors have increasingly turned to scientific, quantitative methods to inform landscape policy and decision making in the presence of uncertainty. In this class, we will apply an innovative ***explore-then-test*** approach that allows students, policy makers and citizens to investigate large numbers of potential future landscapes that could arise from land use and management decisions made everyday in landscapes where people live and work. Students will use a sophisticated simulation modeling system calibrated to local landscapes and future climate change projections to test policy-based approaches for maintaining valued landscape productions and reducing the risk of wildfire and biodiversity loss under the uncertainties of local climate change effects and people's responses to emerging threats.

This course is intended for graduate students and upper division undergraduates from diverse disciplines

Course Organization

Class sessions are organized around a weekly rhythm of lectures and discussions based on common readings, followed by problem-solving sessions applied to a team-based class project using ***Envision*** (http://envision.bioe.orst.edu/). *Envision* is a spatially explicit modeling software that simulates landscape processes and human decision making, and is being used in a wide array of landscape planning projects. Under an award from the National Science Foundation to a collaborative, interdisciplinary research team lead by Bart Johnson and Envision's developer, John Bolte of OSU, the model has been parameterized to simulate climate effects on an 80,000 ha study area to the south and east of the Eugene-Springfield metropolitan area, allowing the class to explore climate change adaptation in a familiar landscape easily accessible to students.

To build their understanding of the interrelated sociocultural and ecological issues related to climate change, students read and critique peer-reviewed literature from climate science, planning, ecology and sociology to prepare for sessions with instructors and guest experts. Students will work in pairs or small teams to simulate and evaluate alternative futures scenarios and accompanying policy sets they develop to guide urban and rural growth, manage wildfire hazard, conserve biodiversity, and sustain livability and ecosystem services in a rapidly changing landscape.

Through this process students will learn lifelong skills for exploring where, when and how climate change impacts may manifest, and how actions by landowners and policy makers may affect landscape qualities that are central to the quality of people's daily lives. In particular they will learn to integrate creativity with critical thinking to help people imagine their choices for the future, evaluate the potential outcomes of different courses of action, and in doing so identify strategies that may prove critical to society's ability to prepare for and respond to climate change.

Course Objectives

The purpose of this course is to develop skills in exploring, conceiving and crafting landscape planning, design and management solutions that respond to the challenges of climate change

By the end of the course, students will be able to:

- Identify important potential interactions and feedbacks between climate change, ecosystem responses and human decisions in light of uncertainties at each level
- Recognize potential linkages between urbanization, biodiversity, ecosystem services and land use policy under projected climate change, and formulate strategies to respond through adaptation actions intended to resist climate impacts, confer resilience to those impacts, or facilitate change to more climate-adapted systems
- Describe and critique the role of simulation models in exploring landscape change and alternative futures for coupled natural/human ecosystems, including the opportunities that an explore-then-test modeling approach offers for developing policy solutions that are robust to future uncertainties

In addition, they will have:

- Gained first-hand experience in how collaborative interdisciplinary research can be harnessed to the societal challenges of responding to climate change
- Developed and tested a set of policy options to guide urbanization, biodiversity conservation and/or fire hazard management under climate change, accompanied by supportive documentation of the results of their investigations

Course Schedule

Week 1: What are the Mechanisms and Projections for Climate Change?

TU 1/7 Course Orientation and Introduction to the Case Study; Lecture, Bart Johnson, UO ;

TH 1/9 Climate Change Foundations; Lecture and discussion, Patrick Bartlein, UO;

Week 2: How Will Ecosystems and People Respond to Climate-Driven Changes in Landscapes?

TU 1/14 Exploring and Testing the Interactions and Feedbacks Among Climate Change, Urbanization, Wildfire and Land Management in the Wildland-Urban Interface – Lecture Bart Johnson, UO; Application Session: Developing and testing alternative futures scenarios

TH 1/16 Agent-based Modeling of Urban Growth; Lecture, Bart Johnson, UO; Application Session: Policy development

Week 3: Localizing Climate Change: Landscapes and People, Choices and Decisions

TU 1/21 Using Survey Data to Understand and Simulate People's Choices for the Future, Lecture, Max Nielsen-Pincus, PSU; Application Session: Testing and evaluating the results of policy implementation. ***Problem 1 Due; Problem 2 (RR policies) Assigned***

TH 1/23 Envision Tutorial 2 (bring computer with Envision); Investigate fire and successional models and policy sets; Application Session – Testing and evaluating livability metrics using Envision

Week 4: Agent-based Modeling of Policy Alternatives

TU 1/28 Growth Management Policies and the Wildland-Urban Interface, – Lecture Max Nielsen-Pincus, PSU; Application Session: Implementing growth management to satisfying different people's goals for the future; ***Prob. 2 Due; Prob. 3 (Fire/Restoration policies) Assigned***

TH 1/30 Policy-based approaches to Integrating Oak Habitat Restoration with Fire Hazard Reduction in the WUI – Lecture, Bart Johnson, UO; Application Session: linking land management goals to landowner propensities and public incentives

Week 5: Using Simulation Models to Investigate the Interactions of Natural and Human Systems

TU 2/4 Modeling Wildland-Urban Interface Fire Hazard – Lecture, Alan Ager, USFS; Application Session: Testing the interactions and feedbacks of population growth, ecological succession, land management and wildfire hazard

TH 2/6 Climate Change, Conservation Planning and Ecological Restoration – Lecture, Bart Johnson, UO; Application Session: Developing land management policies and policy sets; ***Problem 3 Part A (policy sets) Due;***

Week 6: Evaluating and Interpreting Simulation Outcomes

TU 2/11 Livability Assessment Charette – testing student team scenario results; ***Problem 3 Part B due (model outputs for assessment); Problem 4 (scenario revisions) Assigned***

TH 2/13 Balances and Tradeoffs Among Different Landscape-Level Goals, Gwynne Mhuireach, UO; Application Session: Using livability charette results to guide further scenario revisions

Week 7: Emerging Opportunities in Analytical Techniques and Model Synthesis

TU 2/18 Emerging techniques in agent-based modeling, Chris Bone, UO; Application Session: Disentangling interactions and feedbacks in space and time

TH 2/20 Effects of Climate Change and Land Use Decisions on Biodiversity; Gwynne Mhuireach, UO; Application Session: Evaluating Envision Results in HexSim, an individual-based wildlife simulation model

Week 8: Tying the Pieces of the Puzzle Together

TU 2/25 TBA and Envision scenario development work session; ***Problem 4 draft due for critique***

TH 2/27 Recap and discussion of policy development for final project

Week 9: Student final project presentations

TU 3/4 First set of student presentations

TH 3/6 Second set of student presentations

Week 10: No class – Landscape Architecture Review Week

Course Requirements

For each class session in which there are required readings, students will read the assigned articles and develop at least two key synthetic questions to help guide their thinking for the presentation and discussion and submit them to blackboard for review by others prior to the beginning of class. Bring a typed copy of your questions to class with your name, the date and session title, and turn in to the instructors at the end of class.

Each week, a team of 2-3 students will develop and distribute a short list of key "take home lessons" from the past week's sessions and distribute digital copies to the entire class by the following Monday.

Final Project

To synthesize and apply what you learn, the final project requires you to work in teams to explore and test future scenarios of your own development in Envision so as to illuminate and (perhaps) guide land use and land management trajectories in the Willamette Valley. Based on these explorations, students will prepare a poster for presentation in class during week 9. A final version of this poster accompanied by a written report (~10 pages text + figures, tables and citations) that provides supporting documentation and discusses project outcomes is due Monday of finals week.

Evaluation: Class attendance, preparation, participation and daily assignments (40%); Final project in-class presentation (20%); Final project poster and document (40%).

Policy Statement on Academic Honesty

All work submitted in this course must be your own (or your own team's) and originally produced for this course. The use of sources (ideas, quotations, paraphrases) must be properly acknowledged and documented. See the UO guide for avoiding plagiarism:libweb.uoregon.edu/guides/plagiarism/students/

The University Student Conduct Code (available at conduct.uoregon.edu) defines academic misconduct. Violations will be taken seriously and are noted on student disciplinary records. If you are in doubt as to the requirements or the nature of specific projects in this regard, please do not hesitate to contact the instructors before you complete the project/activity in question.

Accommodations for students with disabilities

The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course, which may result in barriers to your participation, please notify the instructor as soon as possible so that accommodations can be made. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu. If you have a documented disability or other health considerations that may affect your class participation, and anticipate needing accommodations in this course, please make arrangements to meet with the professor as soon as possible. If this is a documented disability, please request that the Counselor for Students with Disabilities send a letter verifying your disability.

Inclusion Statement

The School of Architecture and Allied Arts is a community that values inclusion. We are a committed to equal opportunities for all faculty, staff and students to develop individually, professionally, and academically regardless of ethnicity, heritage, gender, sexual orientation, ability, socio-economic standing, cultural beliefs and traditions. We are dedicated to an environment that is inclusive and fosters awareness, understanding, and respect for diversity. If you feel excluded or threatened, please contact your instructor and/or department head. The University Bias Response Team is also a resource that can assist you. Find more information at their website at http://bias.uoregon.edu/index.html or by phoning 541-346-2037.