

USP434/534: Green Building**Course Syllabus****Fall 2022**

Lecturer:	Eric Ridenour
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E-mail:	enr@pdx.edu
Class date and time:	Mondays and Wednesdays, 4.00 to 6.30 pm
Classroom:	Science & Education Center 156
Modality:	In Person
Office Hours:	By appointment (remote or in person, location by arrangement)

Course Description:

Green Buildings is an elective course, intended for students in the Masters in Real Estate Development (MRED), Certificate in Real Estate Property Management (REPM), and Business Minor in Real Estate Property Management programs, but open to all with an interest in current and emerging best practices.

The course is an overview of contemporary green building practices, as well as design and development processes essential to their success. The emphasis is on strategies that have the highest economic return and/or the greatest environmental benefits. The full lifecycle of the built environment is considered, from planning and design through construction, operation, and the end of use.

The course looks first at the community context of a building project and how it affects environmental performance before considering the scale of a single project. Sessions are devoted to the environmental aspects of energy, water use, and material choices, as well as major certification systems, and financial strategies. Design strategies considered include daylight design, energy conservation, and site layout.

Course Materials:

Textbook: none All readings are online, on reserve or in a journal as described below:

1. Assigned articles from the journal **Environmental Building News**, published by **BuildingGreen.com**. This online journal is available via a PSU library subscription.
2. Articles on electronic reserve, through the University's reserve system
3. Additional, non-subscription web-based articles, as listed in the syllabus.

Software:

For this course, you need access to the PSU library's website, PSU course reserves, and word processing software for preparing your term project.

Objectives of the Course/Learning Outcomes:

1. Differentiate sources of information on emerging techniques and materials in the field, particularly the potential limits and biases of information provided for marketing purposes versus those provided by third parties.
2. Demonstrate comprehension of the primary topical areas addressed in the course: energy and water-conserving strategies, environmental impacts of building materials and land use approaches, financial aspects of “alternative” building approaches and tools to manage transformation in the built environment such as codes, certification, etc.
3. Engage readings that address approaches to values and how they inform professional choices – both objective metrics such as monetary value and cultural and personal ethics that inform choices.
4. Undergraduate students: Conduct a literature review and assessment of a significant topic in the field
 - a. write a concise but thorough summary of the readings, including its application in projects
 - b. discuss how on-going innovation and data collection result in evolution in the field and propose questions for further exploration of the topic accordingly
5. Graduate students: Prepare original research
 - a. use interviews with primary sources to go beyond a basic description of the project to identify trade-offs and decisions made in the context of the project
 - b. discuss how numerous factors were synthesized to reach the project result
 - c. evaluate how different trade-offs and decisions might lead to different outcomes

MRED Learning Goals:

1. **Teamwork and Leadership:** Graduates will demonstrate effective leadership and teamwork competencies, supported by high levels of emotional intelligence (e.g., self-awareness, self-management, social awareness, and social management).
2. **Critical Thinking:** Graduates will critically evaluate real estate development challenges and opportunities, analyze those problems with appropriate quantitative and qualitative data analytic techniques, and prescribe and defend subsequent solutions.
3. **Equity and Sustainability Thinking:** Graduates will have an equity and sustainability perspective (e.g., environmental stewardship, intergenerational resources, equitable opportunities, and access).
4. **Communication:** Graduates will effectively communicate complex information with a variety of stakeholders to increase knowledge and achieve objectives.

Green Buildings and LEED®: The syllabus for this course has been reviewed by the GBCI and found to meet the eligibility requirements for the LEED® Green Associate exam.¹

¹ GBCI = Green Building Certification Institute; LEED® = Leadership in Energy and Environmental Design), the leading green building rating system in the U.S. market. Note that the GBCI evaluates each LEED® exam candidate’s background on a case-by-case basis, but upon review of the syllabus for this course, noted that “it would meet the eligibility requirements for the LEED® Green Associate Exam”.

Class Requirements and Grading Scale:

Students are expected to be active participants in the course, with participation and readings contributing to final grades. The major portion of grading will be based on a case study of a successful green building project and periodic written responses to the required readings. One or two brief sketch projects will also be assigned.

1. **Participation:** Active attendance and participation in class is encouraged and expected. Lessons from case study research, course readings and direct experience outside the classroom help to set a context for class presentations.
2. **Response to Readings:** Students are asked to keep notes on readings. These are intended to be a useful resource for your own future reference. They should be in the form of a synopsis, and you are encouraged to include questions and thoughts provoked by the readings.

They will be collected periodically during the course and graded for completeness, and demonstration of comprehension of the readings. Acceptable formats include: D2L, emailed notes or a blog-type format.

3. **In-class exercises:** One or two in-class exercises will be assigned, to illustrate concepts and engage problem-solving skills. These will be graded for participation.
4. **Term Project:** A major focus of the course is a term paper or case study, which will be graded. During the term, interim deadlines will be established for development of an outline and identification of research sources. These will not be graded for content *per se*, but will be tracked for completeness.

Case Study (Graduate Level): The case study assignment is intended for students to understand the opportunities, constraints and trade-offs involved in a green building project. It is generally designed for graduate students, although exceptions can be made by the professor, based on a student's level of preparation. A list of potential case studies will be provided, although ***students are encouraged to identify their own examples.***

Case studies will be due at the final class meeting, in the form of a written report, to be graded. Case studies will also be presented briefly by students during the final exam period, in PowerPoint or other approved digital format. Presentations will be graded for participation.

Term Paper (Undergraduate Level): The term paper is an opportunity for students to research a topic addressed by the course in more detail than covered by course materials. It is generally intended for undergraduates, although exceptions will be made for graduate students, with additional requirements for original research. In-class presentation of term research will be optional. The term paper will be graded.

Examples of Term Paper topics might include:

- A particular energy or water conservation strategy
- A particular material type with green attributes: i.e. certified timber, alternatives to toxic materials, etc.
- A detailed exploration of a particular finance strategy, incentive program or management strategy: green leases, tax incentives, etc.
- A detailed exploration of a regulatory or public-private partnership model focused on innovation in sustainable development.

Grading the assignments will be as follows:

Assignment	Percentage
Participation/ In-Class Exercises	10%
Reading Responses	20%
Term Project: Preliminary Materials	20%
Term Project: Report	50%
Total	100%

Week-by-week Topics and Readings:

The following pages list the topics to be covered each week and the associated readings. Note that most sessions have two sub-parts with separate readings for each sub-topic, *i.e.*: **1A & 1B**

Readings highlighted in grey are **not required for undergraduates**.

Key to Sources: J = Journal: EBN (PSU Online Subscription); W= Web readings, general access; R = Reserve; D = D2L

9/26/22

1A Course Introductions and Logistics

(no readings)

1B Valuing Nature: the case(s) for Green Building

Required Readings

- J *Paula Melton, Green Design: What's Love Got to Do with It? Environmental Building News, Dec. 2013*
- W *Elizabeth F. Calabrese & Stephen R. Kellert, The Practice of Biophilic Design*
bullfrogfilms.com/guides/biodguide.pdf
- W **USGBC: Benefits of Green Building** usgbc.org/press/benefits-of-green-building
- J *Paula Melton, AIA Ethics Code Now Covers Sustainability in Depth, EBN, Sept. 2018*

10/3/22

ASSIGNMENT DUE: 1-page free-write "What does it mean to be an ethical developer?"

2A Urban Form

Required Readings

- R *Timothy Beatley, Land Use & Urban Form: Planning Compact Cities - Chapter 2*
- W *Todd Litman, Understanding Smart Growth Savings: What We Know About Public Infrastructure and Service Cost Savings, And How They are Misrepresented By Critics, Victoria Transport Policy Institute; Dec. 2014; www.vtpi.org/sg_save.pdf*
- J *Alex Wilson, Sprawl and Health: Are Modern Land-Use Patterns Making Us Sick?, EBN April 2002*

2B Transportation Factors

Required Readings

- J *Alex Wilson & Rachel Navaro, Driving to Green Buildings: The Transportation Energy Intensity of Buildings, EBN, November 2018 (be sure to pull up this recent update to the*

original article.)

- W Donald C. Shoup: **The High Cost of Free Parking**, article ACCESS Magazine, 1997;
accessmagazine.org/spring-1997/the-high-cost-of-free-parking
- W **AVs And Real Estate – A Guide To Potential Impacts** 21-Aug-2017
urbanismnext.uoregon.edu/2017/08/21/avs-and-real-estate-a-guide-to-potential-impacts/

10/10/22

3 Design Strategies, Design/Construction Process, Commissioning

Required Readings

- J Allyson Wendt & Nadav Malin: **Integrated Design Meets the Real World**, EBN, May 2010
- J Candace Pearson, **How to Make Integrated Project Delivery Work for Your Project**, EBN, April 2015
- W NW Energy Council **Commissioning Fact Sheet**, October 2017
neec.net/wp-content/uploads/2017/11/WSEC-Commissioning-10-2017-1.pdf
- W **Design Briefs**, Energy Design Resources: **Building Commissioning** [Loaded to Canvas](#)
- J **How to Run a Great Workshop**: 37 Tips & Ideas; EBN, May 2016

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ASSIGNMENT DUE: Term Project topic & first round of reading responses: Weeks 1-4

4A Site Design

Required Readings

- J Alex Wilson: **Getting to Know a Place: Site Evaluation as a Starting Point for Green Design**, Environmental Building News, March 1998
- J Alex Wilson: **Development and Nature: Enhancing Ecosystems Where We Build**, Environmental Building News, February 2001
- W Kaid Benfield: **Is This the World's Greenest Neighborhood?**, The Atlantic, Aug. 2011
theatlantic.com/international/archive/2011/08/is-this-the-worlds-greenest-neighborhood/244121/
- W **Grow Community, Bainbridge Island**, Action Plan bioregional.com/resources/grow-community-one-planet-action-plan-2012
- W Anne Guillette: **Low-Impact Development Technologies** wbdg.org/resources/lidtech.php

4B Water Systems: Stormwater and Water Use

Required Readings

- J Candace Pearson: **Net-Zero Water & More: Moving Beyond "Low Flow"**, EBN May 2014
- J Paula Melton, **Putting a "LID" on Harmful Stormwater Runoff**, EBN August 2014
- J Brent Ehrlich & Paula Melton: **Resilient, Sustainable Water Management: A Holistic Approach**, EBN Oct. 2021

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ASSIGNMENT DUE: Term Project: Sources, Outline and Hypothesis

5A Daylighting for Energy Savings and Enhanced Productivity

Required Readings

- J Paula Melton, **Doing Daylight Right** - Environmental Building News, April 2012
- J **Shedding Light on Light Quality** - Environmental Building News, March 2008
- W Heschong-Mahone Group: **Skylighting & Retail Sales**: Condensed Report
h-m-g.com/downloads/Daylighting/retailc.pdf

5B Energy Part 1: Heating & Cooling basics

Required Readings

J The following one-page primer topics from EBN:

- *How the Sun's Path Can Inform Design*
- *How Insulation Works*
- *Thermal Bridging*
- *Thermal Mass—What It is and When It Improves Comfort*
- *Vapor Retarders and Air Barriers—Managing Moisture in Building Envelopes*
- *Dry-Bulb? Wet-Bulb? What's the Difference?*
- *Reducing Heat Flow Through Windows*
- *Basics of the Psychrometric Chart*
- *How R-Value is Calculated*

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6 Energy: Efficiency & Renewable Production

Required Readings

- J Alex Wilson: *Resilient Design: Natural Cooling*, EBN, January 2012
- W Carl Ian Graham, *High-Performance HVAC*, wbdg.org/resources/hvac.php
- J Martin Holladay, *Five Reasons to Be Optimistic About Solar Energy*, EBN May, 2018
- W Green Building Advisor: *The Building Envelope*
greenbuildingadvisor.com/green-basics/the-building-envelope
- J Tristan Roberts: *Measuring Energy Use in Buildings: Do Our Metrics Really Add Up?*; -
Environmental Building News, May 2011

11/7/22

ASSIGNMENT DUE: Reading Responses Round 2, Weeks 5-7

7A Environmental Aspects of Materials Selection

Required Readings

- J *Building Materials: What Makes a Product Green Today?* EBN, July 7, 2020
- W Wayne Trusty, *Misconceptions and Misunderstanding about LCA*, Athena Institute
athenasmi.org/wp-content/uploads/2012/05/DecBSJ_misconceptions_LCA.pdf
- J Brent Ehrlich *The PVC Debate: A Fresh Look*, EBN, February 2014
- J Jennifer Atlee & Tristan Roberts: *Behind the Logos: Understanding Green Product Certifications*, Environmental Building News, September 2014
- J T. Roberts & P. Melton: *Why Chemical Transparency Matters*; EBN; Nov. 2015
- W Andrew Crampton; *Cross-Laminated Timber: An Innovative Building Material Takes Hold in Oregon*; *Metroscape*, 2017; pdx.edu/ims/sites/www.pdx.edu.ims/files/crosslaminated_timber.pdf

7B Indoor Air Quality:

Required Readings

- J Alex Wilson: *Mold in Buildings: What It Is and How to Keep It Out*, EBN, June, 2001
- J Alex Wilson and Nadav Malin: *The IAQ Challenge: Protecting the Indoor Environment*, EBN, May 1996

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8 Certification: Overview of major systems

Topics

- LEED
- EarthAdvantage
- Emerging Programs: WELL, Fitwell, etc.
- EnergyStar and HERS
- Residential GreenBuild Programs

Required Readings

- J N. Malin, P. Melton & T. Roberts; *New Concepts in LEED v4*; EBN, Oct. 2012
- W EarthAdvantage Program: *Commercial Program: Brochure*:
earthadvantage.org/assets/documents/EAC/EACCommercialBrochure-2016.pdf

- W Green Building Advisor: **Local Green Building Programs**
greenbuildingadvisor.com/green-basics/local-green-building-programs
- J Tristan Roberts, **Certified Wood: How SFI Compares to FSC**, EBN March 2015

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9A **Valuing Green & Metrics**

Required Readings

- D Cascadia Green Building Council et al: **Living Building Financial Study Executive Summary & Comparison Matrix**, April 2009
- J Tristan Roberts: **How to Build Green At No Added Cost**, EBN, March 2014
- W New Buildings Institute, Inc., **Benefits Guide: A Design Professional's Guide to High Performance Office Building Benefits**, 2004
dcat.net/workshoptoolkit/Workshop_Toolkit/Benefits_files/AdvancedBuilding_benefitsguideNBI.pdf
- W Institute for Market Transformation: **Recognition Of Energy Costs & Energy Performance In Commercial Property Valuation: Considerations & Resources for Appraisers**
imt.org/uploads/resources/files/Energy_Reporting_in_Appraisal.pdf
- W **EXECUTIVE SUMMARY: Davis Langdon, 2007 The Cost of Green Revisited**
global.ctbuh.org/resources/papers/download/1242-cost-of-green-revisited-reexamining-the-feasibility-and-cost-impact-of-sustainable-design-in-the-light-of-increased-market-adoption.pdf
- W **Green Leases Are Critical to Achieve CRE Recovery, Net Zero Buildings**
envizi.com/blog/green-leases-are-critical-to-cre-recovery-and-to-achieve-net-zero-buildings

9B **Incentives & Constraints**

Required Readings

- J Allyson Wendt: **Navigating Incentives and Regulations for Green Building**, Environmental Building News, April 2008
- W **Business Oregon Incentives:** oregon.gov/energy/Incentives/Pages/default.aspx
- W **Oregon Small-Scale Energy Loan Program (SELP);** oregon.gov/energy/incentives/pages/energy-loan-program.aspx
- W **Stretch and Reach Codes:** bcapcodes.org/beyond-code-portal/stretch-and-reach-codes
- J **James Wilson: Code Officials Take on New Role in High-Performance Design**, EBN March 2018
- J Nadav Malin & Tristan Roberts, **Energy Reporting: It's the Law**, EBN, August, 2012

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ASSIGNMENT DUE: Reading Responses Round 3, Weeks 8-10

10 **Pushing the envelope**

Required Readings

- W **The Living Building Challenge 4.0 (June 2019)** living-future.org/LBC4.0
- J Candace Pearson: **The Four Core Issues to Tackle for Resilient Design (And the Programs That Can Help)**, EBN March, 2016
- J **Nancy Eve Cohen: USGBC Announces RELi As Its Resilient Design Rating System**
- J Joshua Radoff, **Net Zero Energy Is Achievable: Here's How**; EBN, Aug. 2016
- J Mark Piepkorn, **The Natural Building Movement** – EBN, May 2005

12/5/22, 3:30 – 5:20 pm (Note EARLIER START TIME than regular classes)

ASSIGNMENTS DUE: Term Project Presentation Materials

10 **Finals Period: Case Study Presentations**

STUDENT RESOURCES AND POLICIES OVERVIEW

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[Accommodations/DRC](#)

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[Research Guides and Tutorials \(Library\)](#)

[Sexual Harassment](#)

[Student Health and Counseling \(SHAC\)](#)

[Student Code of Conduct](#)

[Title IX](#)

ATTENDANCE POLICY

You are expected to attend class regularly, either in person or remotely (when necessary). However, all lectures will be recorded, so you can watch them if you had to miss class. Veterans must comply with attendance standards set by the V.A. Athletes must provide their list of class conflicts before their first absence.

ACADEMIC MISCONDUCT

Students are expected to be ethical not only in the classroom, but also out of the classroom. It is in all students' interest to avoid committing acts of academic dishonesty and to discourage others from committing such acts. Academic dishonesty includes, but is not limited to, the following examples: engages in any form of academic deceit; refers to materials or sources or uses devices not authorized by the instructor for use during any quiz or assignment; provides inappropriate aid to another person in connection with any quiz or assignment; engages in Plagiarism.

Any academic misconduct, including, but not limited to, plagiarism, cheating, fabrication, aiding and abetting academic misconduct, falsification of records and documents, communication with fellow students during examination and quizzes and/or using the work of another student will immediately result in a failing grade for the course. Furthermore, students are not allowed to discuss the content of any test, quiz, or homework with anyone. Additional sanctions by The School of Business may also be imposed if it deems necessary.

Plagiarism is the act of claiming someone's work as your own through copying it without giving the creator of the work credit. Plagiarism can also include using another person's theories, ideas, or phrases without proper attribution. The simplest way to avoid plagiarizing is to always cite the sources from which you gather information or develop arguments – just cite anything you use from someone else (it actually makes your work stronger!). Plagiarism is a serious issue and is a violation of the PSU Student Conduct of Code. University policy requires instructors to report all instances of plagiarism and penalize the perpetrator(s) according to guidelines set. Please use the resources provided by the [PSU library](#) if you have any questions on how to cite.

DIVERSITY & INCLUSION

PSU values diversity and inclusion; we are committed to fostering mutual respect and full participation for all students. My goal is to create a learning environment that is equitable, useable, inclusive, and welcoming. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment.

ACCOMMODATIONS

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, drc@pdx.edu, <https://www.pdx.edu/drc>.

- If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and discuss your accommodations.
- Students who need accommodations for tests and quizzes are expected to schedule their tests to overlap with the time the class is taking the test.
- Please be aware that the accessible tables or chairs in the room should remain available for students who find that standard classroom seating is not useable.
- For information about emergency preparedness, please go to the Fire and Life Safety webpage (pdx.edu/environmental-health-safety/fire-and-life-safety) for information.

TITLE IX

Portland State is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment (sexual assault, domestic and dating violence, and gender or sex-based harassment and stalking). If you have experienced any form of gender or sex-based discrimination or sexual harassment, know that help and support are available. PSU has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and on-housing accommodations, helping with legal protective orders, and more. Information about PSU's support services on campus, including confidential services and reporting options, can be found on PSU's Sexual Misconduct Prevention and Response website at: <http://www.pdx.edu/sexual-assault/get-help> or you may call a confidential IPV Advocate at 503-725-5672. You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to either the Office of Equity and Compliance or the Office of the Dean of Student Life.

SEXUAL HARASSMENT:

As faculty, one of our responsibilities is to help create a safe learning environment for students and for the campus as a whole. Please be aware that faculty have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment to a confidential employee who does not have this reporting responsibility, you can find a list of those individuals here: pdx.edu/sexual-assault/get-help.

EMERGENCY PREPAREDNESS

For information about emergency preparedness, please go to the Fire and Life Safety webpage(pdx.edu/environmental-health-safety/fire-and-life-safety) for information.

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STUDENT HEALTH AND COUNSELING (SHAC)

The Center for Student Health and Counseling (SHAC) is a community-based health care organization that provides high quality, accessible mental health, physical health, dental, and testing services targeted to the needs of the PSU student population. To make an appointment with SHAC, please call SHAC at 503.725.2800 or go directly to the clinic (1880 SW 6th Ave. UCB, Suite 200). Email address: askshac@pdx.edu & pdx.edu/shac

BASIC NEEDS AT PORTLAND STATE

It can be challenging to do your best in class if you have trouble meeting basic needs like safe shelter, sleep, and nutrition. Resource centers across campus are here to provide assistance, referrals, and support. Please contact anyone on this list for assistance:

Basic Needs Hub: basicneedshub@pdx.edu

Portland State Food Pantry: psufp.com; pantry@pdx.edu

C.A.R.E. Team: askdos@pdx.edu; (503) 725-4422

OTHER STUDENT RESOURCES

- The Writing Center: pdx.edu/writing-center
- Diversity and Multicultural Student Services: pdx.edu/dmss
- Financial Wellness Center: pdx.edu/student-financial/financial-wellness-center
- For information on food assistance and other resources: pdx.edu/student-access-center.

LECTURE RECORDINGS

We will use technology for lecture recordings in this course. Our use of such technology is governed by FERPA, the Acceptable Use Policy and PSU's Student Code of Conduct. A record of all meetings and recordings is kept and stored by PSU, in accordance with the Acceptable Use Policy and FERPA.

All class recordings will be deleted at the end of the quarter.

Your instructor will not share recordings of your class activities outside of course participants, which include your fellow students, TAs/GAs/Mentors, and any guest faculty or community-based learning partners that we may engage with.

You may not share recordings outside of this course. Doing so may result in disciplinary action.

Technology Requirements

The following list of tools encompasses every type of technology you will encounter in this course if you are joining remotely. It is your responsibility to obtain access to these in advance of your first assignment or let me know of your limitations by the end of week 1.

- Functional webcam
- Microphone (internal or USB)
- Google Chrome browser
- Reliable internet connection

If you have technical questions/problems related to using D2L or obtaining an Odin account, contact the OIT Help Desk at help@pdx.edu or by calling (503) 725-4357.

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