USP 434/534: Green Buildings

Syllabus

Table of Contents:

Course Overview:

Lecturer	Krissy Govertsen
Term:	Winter 2025
E-mail	krissyg@pdx.edu
Class date and time:	Tuesday's 6:40 PM – 9:20 PM
Classroom:	URBN 204
Modality:	In person
Office Hours:	By appointment (remote or in person, location by arrangement)

Course Description:

An overview of contemporary green building practices and the design and development processes essential to their success. Emphasis 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.

Course Materials:

- *Textbook*:
  - Free Access through PSU Library (Digital Only): Guide to the LEED Green Associate Exam by Michelle Cotrell.
    - Can be accessed via web browser.
    - Can be fully downloaded and accessed via Adobe Digital Editions.
  - It is not required to buy any books from the bookstore.
- *Articles:*
  - Available on BuildingGreen through the PSULibrary.
- Websites:
  - Free websites like the water footprint calculator, Appliance Calculator, Carbon footprint calculator, and PV Watts.
- Videos:
  - Available on YouTube, USGBC, or BuildingGreen

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Equipment Requirements:

- You will need to be able to access Canvas in the classroom as quizzes and the midterm will happen during course time. A laptop computer is strongly recommended for compatibility and optimal functionality. Mobile devices will not suffice. Tablets may or may not work. User discretion is advised.

Objectives of the Course/Learning Outcomes:

- Develop the ability to study and pass a professional accreditation exam (Note: the LEED Green Associate exam is the base level for this course. Should a student enter the course with this certification, they may work with the instructor to come up with a custom plan to pursue a second certification. Examples include, but are not limited to, LEED AP with any specialty, WELL AP, or SITES AP).
- 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 standards, codes, certification, building performance, retrofit, resilience and building deconstruction and reuse.

Class Requirements:

Students are expected to be active in-person participants in this course. Class participation, including active engagement with quest lecturers as well as graded assignments including reflections, quizzes, midterms, presentations and a final report will contribute to final grades.

1. Participation: Regular and complete attendance and active participation in class is expected. Lessons from case study research, course readings and direct experience outside the classroom help to set a context for class presentations.
2. Reflections to guest lecturers: Students are asked to keep notes on guest lecturers and ask questions about their experience and the topics they covered. Guest lecturer reflections and questions are due 24 hours after class. They should be submitted to Canvas as a one page response.
3. Quizzes: There will be weekly graded quizzes on the reading material to intermediately measure reading retention.
4. Midterm: There will be a practice LEED Green Associate Exam as a midterm. Students may replace their midterm exam grade with a 100 if they pass the exam prior to 3/15/2025. Students who enter the course with an existing LEED Green Associate Credential, will have the opportunity to pursue another certification of their choice. Schedule a meeting with the instructor to develop a custom plan.

5. Final Project:
    a. Undergraduate students will conduct a thoroughly researched case study of one of the LEED-certified buildings on the Portland State University (PSU) campus. The goal is to analyze how the building achieves its LEED certification and contributes to the campus's sustainability goals, with insights tailored for an article submission to a local magazine, USGBC, or BuildingGreen. To foster a collaborative learning environment, undergraduates should meet regularly to discuss their individual projects, compare notes, and inspire each other with creative ideas and approaches. These meetings should provide an opportunity to exchange constructive feedback, share resources, and develop a deeper understanding of sustainable building practices through group dialogue and mutual encouragement.
    b. Graduate students: Graduate students will be placed into small groups to conduct a comprehensive analysis of a Portland neighborhood's green building efforts, and propose a new green building for that neighborhood, as part of their final project. This research will focus on green building certifications, energy performance metrics, and sustainability measures in the area. The assignment emphasizes critical thinking, data analysis, and the practical application of sustainability principles to real-world urban settings.
        i. Note: If a group would like to enter the U.S. EPA RainWorks challenge instead, please speak to the instructor.
6. Final Presentation:
    a. Undergraduates and Graduate groups will present their final project in a ~10 minute presentation to their peers and a panel of guest lecturers. After the presentation they will answer questions about their presentation.

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Grading:

Assignment	Points	Percentage
Class Participation	75	13%
Guest Lecturer Reflections	54	9%
Quizzes/Homework	170	29%
Midterm	100	17%
Final Project: Report	135	23%
Final Presentation	24	4%
Peer Review	24	4%
Total	582	100%

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Course Schedule:

Weeks	Building Stage
1-5	Planning and Design
6-7	Operation
8-10	End of Life.. or not?
11	Final Presentations

Week 1 – 1/1/2025: Course Introductions and Logistics

Preparation:

- ☐ Week 1
  - ☐ Read LEED Green Associate Candidate Handbook (18 pages)

In-Class Agenda:

1. Instructor and Student Agenda
2. Course Overview
   a. Syllabus
   b. Canva Walkthrough
3. Lecture 1
   a. What is Green Building?

Week 2 – 1/14/2025: LEED Green Associate Part 1

Preparation:

- ☐ Week 2 Part 1
  - ☐ Create an USGBC Account.
    - ☐ Check the “I am a student” box to receive discounts on exam registration.
    - ☐ Submit your USGBC profile link via assignments.
  - ☐ Read Chapter 1 of Guide to the LEED Green Associate Exam (6 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
  - ☐ Read Chapter 2 of Guide to the LEED Green Associate Exam (10 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 2 Part 2
  - ☐ Read Chapter 3 of Guide to the LEED Green Associate Exam (12 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
  - ☐ Read Chapter 4 of Guide to the LEED Green Associate Exam (6 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 2 Part 3
  - ☐ Read article World Green Building Council Showcases Cost-Effective Green Building Benefits Throughout the World
  - ☐ Read Chapter 5 of Guide to the LEED Green Associate Exam (14 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 2 Part 4
  - ☐ Read article Green Building 101: What is LEED?
  - ☐ Read Chapter 6 of Guide to the LEED Green Associate Exam (16 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)

In-Class Agenda:

1. Guest Lecturer 1:
   a. Daryl M. Pierson, PhD, Director, Planning and Sustainability Office
2. Lecture 1:
   a. Standards, and Codes
3. Week 2 Quiz

Week 3 – 1/21/2025: LEED Green Associate Part 2

Preparation:

- ☐ Week 3 Part 1
  - ☐ Read Chapter 7 of Guide to the LEED Green Associate Exam (14 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 3 Part 2
  - ☐ Read article Green Building 101: What makes a site sustainable?
  - ☐ Read Chapter 8 of Guide to the LEED Green Associate Exam (16 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 3 Part 3
  - ☐ Read article Green Building 101: How does water efficiency impact a building
  - ☐ Read Chapter 9 of Guide to the LEED Green Associate Exam (12 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 3 Part 4
  - ☐ Read article: Green Building 101: Why is energy efficiency important?
  - ☐ Read Chapter 10 of Guide to the LEED Green Associate Exam (15 pages)

In-Class Agenda:

4. Guest Lecturer 2:
   a. Amanda Ingmire, Built Environment Program Co-Lead, Oregon Department of Environmental Quality
5. Lecture 2
   a. Certifications
6. Week 3 Quiz

Week 4 – 1/28/2025: LEED Green Associate Part 3

Preparation:

- ☐ Week 4 Part 1
  - ☐ Watch video: "The Story of Stuff"
  - ☐ Read article Green Building 101: Sustainable materials and resources
  - ☐ Read Chapter 11 of Guide to the LEED Green Associate Exam (20 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 4 Part 2
  - ☐ Read article Green Building 101: What is indoor environmental quality
  - ☐ Read Chapter 12 of Guide to the LEED Green Associate Exam (18 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 4 Part 3
  - ☐ Read Chapter 13 of Guide to the LEED Green Associate Exam (8 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)
- ☐ Week 4 Part 4
  - ☐ Read Chapter 14 of Guide to the LEED Green Associate Exam (5 pages)
    - ☐ Complete Quiz at the End of Chapter (Answers are in Appendix K)

In-Class Agenda:

7. Guest Lecturer 3:
   a. Julie McEvoy Baines, Partner, Project Pivot
8. Lecture
   a. Sustainability Analyses
9. Week 4 Quiz

Week 5 – 2/4/2025: Midterm

Preparation:

- [ ] Week 5 Review: Midterm Preparation
  - [ ] Read LEED v4 Rating System Selection Guidance
  - [ ] Read Guide to LEED Certification: Commercial
  - [ ] Review the LEED v4 for BD+C: New Construction and Major Renovation Checklist

In-Class Agenda:

1. Midterm (2 hour time limit)
2. Final Project Overview & Group Assignment

Week 6 – 2/11/2025: Building Performance Standards

Preparation:

- [ ] Home Improvement Plan
    - [ ] Use the water footprint calculator to estimate the amount of water you consume (gallons per year).
    - [ ] Use the Appliance Calculator to estimate the amount of energy you consume (kWh per year)
    - [ ] Use the Carbon footprint calculator to estimate your carbon footprint (Annual CO2 emissions (lbs)).
    - [ ] Use PV Watts Calculator to estimate the amount of solar your home can generate (use default inputs and draw area on roof) (kWh per year)
    - [ ] Develop a plan to retrofit and decarbonize.
    - [ ] Summarize your findings in a report.

In-Class Agenda:

1. Guest Lecturer 4:
    a. Hetvi Vora, WELL AP, WELL PTA, LEED AP ID+C, Associate, Branch Pattern
2. Lecture
    a. Building Performance Standards
3. Home Improvement Plan Comparisons

Week 7 – 2/18/2025: Operations & Maintenance

Preparation:

- [ ] How Buildings Fail Their Users
- [ ] Pest Prevention: Steps Designers Can Take
- [ ] Post-Occupancy Evaluations: Ignorance Isn't Bliss
- [ ] Why Post-Occupancy Review Is the Future of Design (And How It Can Serve You Now)
- [ ] Design Strategies for Occupant Engagement—and Why They Boost Performance
- [ ] Four Reasons Building Performance Is Worse Than Predicted
- [ ] Verifying Project Outcomes: Which Metrics Work?

In-Class Agenda:

1. Guest Lecturer 5:
    a. Emma Cassavant, Engineering Consultant, Vermont Energy Investment Corp
2. Lecture
    a. Operations and Maintenance
3. Week 7 Quiz

Week 8 – 2/25/2025: Existing Buildings

Preparation:

- Existing Buildings Are Architecture's Future
- The Hidden Science of High-Performance Building Assemblies
- Go with the Flows: The Promise and Peril of Hygrothermal Modeling
- Building Enclosure Commissioning: Ensuring Durable and Energy-Efficient Buildings
- Mind the Gaps: Making Existing Buildings More Airtight

In-Class Agenda:

1. Guest Lecturer 6
    a. Alex Boetzel, Head of Residential Innovations, Earth Advantage
2. Lecture
    a. Existing Buildings, Decommissioning and Reuse
3. Week 8 Quiz

Week 9 – 3/4/2025: Resilience

Preparation:

- [ ] An Advocate's Guide to Resilience Regulations
- [ ] The Four Core Issues to Tackle for Resilient Design (And the Programs That Can Help)
- [ ] Focus on Resilient Housing
- [ ] Resilient Design: Smarter Building for a Turbulent Future
- [ ] Submit Project Peer Review on Canvas and Bring 2 printed copies

In-Class Agenda:

1. Lecture
    a. Resilience
2. Final Project Draft Peer Review
3. Week 9 Quiz

Week 10 – 3/11/2025: Green Building Careers

Preparation:

- [ ] Bring 30 printed copies of your most recently updated resume

In-Class Agenda:

1. Green Building Careers Overview
2. Resume Speed Rounds
3. Course Feedback Quiz / Group Work Time

Week 11 – 3/18/2025: Final Project

Preparation:

- [ ] Submit Final Report by Sunday 3/16/2025 at 11:59 PM (.pdf)
- [ ] Submit Final Slides by Monday 3/17/2025 at 11:59 PM (.pdf)
- [ ] Submit Peer Feedback by Wednesday 3/19/2025 at 11:59 PM on Canvas

Final Agenda:

1. Presentations

Rubrics:

Class Participation

Criteria	Excellent (1.5)	Proficient (.75)	Needs Improvement (.5)
Attendance	Consistently present and on time, with no absences.	Occasionally absent or tardy, with some notification.	Frequently absent or tardy without notification.
Attention & Engagement	Fully engaged, attentive, and actively participates in lectures.	Occasionally distracted but makes an effort to engage.	Frequently distracted or disengaged during lectures.
Engagement with Lecture	Regularly engages by asking relevant questions and providing thoughtful comments.	Engages occasionally, providing basic comments or questions.	Rarely engages or responds to lecture material.
Asking Questions of Guest Lecturers	Actively engages with guest lecturers by asking insightful, relevant questions.	Asks occasional questions, though they may lack depth.	Does not ask questions or engage with guest speakers.
Providing Peer Feedback & Reviews	Provides detailed, thoughtful, and constructive peer feedback that enhances group work.	Provides some feedback but lacks constructive depth.	Does not contribute meaningful peer feedback or reviews.

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Guest Lecturer Reflection

Criteria	Excellent (3)	Proficient (2)	Needs Improvement (1)
Attentiveness	Fully attentive throughout; no mobile devices or distractions. Actively takes notes and demonstrates focus.	Moderately attentive; occasional signs of distraction (e.g., checking phone but not disruptive).	Disengaged; consistently on mobile device or inattentive to the speaker.
Quality	Questions are insightful, specific, and clearly connected to the lecture content.	Questions are general or lack connection to the specific lecture topic.	Does not ask questions or poses irrelevant or inappropriate questions.
Reflection on the Lecture	Provides thoughtful reflections connecting the lecture to course themes or personal insights.	Reflection is basic, with limited connections or critical thinking about the lecture content.	Does not provide any reflection or submits irrelevant content.

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Home Improvement Plan Rubric

Category	Excellent (3 Points)	Proficient (2 Points)	Needs Improvement (1 Point)
Baseline	Comprehensive and accurate baseline for energy and water usage	Baseline includes most data but with minor inaccuracies	Incomplete or inaccurate baseline information
Water Reduction Strategy	Clear, actionable water-saving strategies with examples and feasibility	Vague or limited strategies; lacking specifics	Missing strategy or unrealistic solutions
Electricity Reduction Strategy	Clear, actionable energy-saving strategies with examples and feasibility	Vague or limited strategies; lacking specifics	Missing strategy or unrealistic solutions
Renewable Strategy	Detailed plan for integrating renewable energy sources; feasible	Basic suggestions with limited details/relevance	Missing renewable energy strategy or impractical ideas
Cost Analysis	Accurate estimates, logical calculations, and clear payback timeline	Some errors in data or unclear calculations	Incomplete or inaccurate analysis
Presentation	Well-organized, professional with charts/tables and clear visuals	Mostly clear but lacks polish or effective visuals	Disorganized or hard to follow with minimal visuals

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Panel Reviewer Presentation Rubric

Criteria	Excellent (15-10 points)	Proficient (5-10 points)	Needs Improvement (1-5 points)
Research Quality	Thorough research, utilizing a variety of sources	Adequate research, but may lack depth.	Limited research with minimal sources.
Application of Sustainability Principles	Demonstrates deep understanding of sustainability principles.	Clear connection between research and sustainability principles (e.g., LEED, energy performance).	Basic understanding of sustainability principles with few connections.
Depth of Analysis	In-depth analysis that ties multiple aspects of the project together, showcasing critical thinking and insight into trade-offs.	Provides some analysis, but may miss deeper insights or fail to connect ideas comprehensively.	Minimal analysis or overly simplistic. Focuses only on surface-level facts.
Organization & Structure	Well-organized, with a clear structure and logical flow. All required sections included.	Follows most assignment guidelines.	Poor organization, missing required sections or unclear flow.
Clarity & Writing Quality	Clear, concise, professional writing with few to no grammatical errors.	Clear writing, but some grammatical errors or awkward phrasing.	Needs significant revision.
Interviews & Primary Data	Strong use of well-integrated interviews that substantiate the analysis.	Includes some interviews, but they may not be fully integrated or lack depth.	Minimal or no primary data or interviews.
Visuals & Media	High-quality visuals well-integrated into the project, supporting key arguments.	Adequate visuals, but they may not be well-integrated or are of average quality.	Few or low-quality visuals. Not well integrated or irrelevant.
Innovative Insights & Future Vision	Strong, creative vision for the future.	Some creative or forward-thinking ideas, but may lack depth.	No clear future vision or innovative suggestions.
Adherence to Requirements	Fully adheres to all formatting and submission requirements	Meets most formatting and submission requirements	Does not meet basic requirements for formatting or submission.

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Group Work Peer Review Rubric

Criteria	Excellent (3)	Proficient (2)	Needs Improvement (1)
Level of Contribution	Actively contributed to all aspects of the project, providing valuable input and taking on significant tasks.	Contributed regularly but may have taken on fewer tasks or shown less initiative.	Contributed minimally, with little input or involvement in key aspects of the project.
Collaboration and Teamwork	Demonstrated excellent teamwork, collaborating effectively with other members and offering support where needed.	Worked well within the group but occasionally struggled with coordination or communication.	Poor teamwork, lacked coordination, did not collaborate well or had difficulty working with others.
Communication and Engagement	Consistently communicated ideas clearly, engaged in team discussions, and provided constructive feedback.	Communicated ideas adequately, but occasionally lacked clarity or engagement in group discussions.	Limited communication and engagement in group discussions, or contributed little to the decision-making process.
Responsibility and Accountability	Took full responsibility for assigned tasks, met deadlines, and delivered quality work.	Completed assigned tasks, but sometimes missed deadlines or needed additional guidance.	Did not meet deadlines, was unclear about responsibilities, or required constant follow-up to complete tasks.
Work Quality and Consistency	Delivered high-quality work consistently throughout the project, with attention to detail.	Delivered good quality work, but occasionally lacked attention to detail or consistency.	Work quality was inconsistent or subpar, with many areas requiring significant revision or improvement.
Support During Presentation	Actively supported the group during the presentation by speaking clearly, answering questions, and helping with technical aspects. (for undergrads, think about how they supported during presentation practice)	Contributed during the presentation, but may have had limited speaking or technical involvement. (for undergrads, think about how they supported during presentation practice)	Minimal involvement in the presentation, lacked support or failed to actively participate. (for undergrads, think about how they supported during presentation practice)

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Final Project Report Rubric

Criteria	Excellent (15-10 points)	Proficient (5-10 points)	Needs Improvement (1-5 points)
Research Quality	Thorough research, utilizing a variety of sources	Adequate research, but may lack depth.	Limited research with minimal sources.
Application of Sustainability Principles	Demonstrates deep understanding of sustainability principles.	Clear connection between research and sustainability principles (e.g., LEED, energy performance).	Basic understanding of sustainability principles with few connections.
Depth of Analysis	In-depth analysis that ties multiple aspects of the project together, showcasing critical thinking and insight into trade-offs.	Provides some analysis, but may miss deeper insights or fail to connect ideas comprehensively.	Minimal analysis or overly simplistic. Focuses only on surface-level facts.
Organization & Structure	Well-organized, with a clear structure and logical flow. All required sections included.	Follows most assignment guidelines.	Poor organization, missing required sections or unclear flow.
Clarity & Writing Quality	Clear, concise, professional writing with few to no grammatical errors.	Clear writing, but some grammatical errors or awkward phrasing.	Needs significant revision.
Interviews & Primary Data	Strong use of well-integrated interviews that substantiate the analysis.	Includes some interviews, but they may not be fully integrated or lack depth.	Minimal or no primary data or interviews.
Visuals & Media	High-quality visuals well-integrated into the project, supporting key arguments.	Adequate visuals, but they may not be well-integrated or are of average quality.	Few or low-quality visuals. Not well integrated or irrelevant.
Innovative Insights & Future Vision	Strong, creative vision for the future.	Some creative or forward-thinking ideas, but may lack depth.	No clear future vision or innovative suggestions.
Adherence to Requirements	Fully adheres to all formatting and submission requirements	Meets most formatting and submission requirements	Does not meet basic requirements for formatting or submission.

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