Green Buildings
USP 529 [3 Cr.], Winter 2010
Tuesdays 6:40-9:20 pm, Shattuck Hall 249
Department of Urban Studies & Planning
College of Urban and Public Affairs
Portland State University

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Course Syllabus

Description: Green Buildings is an elective course in the Certificate in Real Estate Development program. The course offers an overview of contemporary green building practices, as well as the 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 cycle of the built environment is considered, from planning and design through construction and operation, and the end of use for a building.

The course looks briefly 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 materials choices. Specific design strategies with multiple positive impacts are analyzed in some detail, such as daylight design, energy conservation, and site layout.

Students: This course is designed for graduate students who intend to take an active role in shaping the built environment, either as developers or planners. Specific knowledge of the building industry is helpful, but not a requirement for the course.

Professor: Eric Ridenour is an Associate, Project Architect and Urban Designer with SERA Architects of Portland. He has fourteen years’ experience in architecture as well as community and campus planning on projects throughout the Northwest. He has experience on a wide assortment of building types, including: fire stations, a convention center, golf/resort, community centers, retail, affordable housing, housing-retail mixed use at Orenco Station, and single family homes. Planning projects include: Wilder master plan [Newport, OR], Pacific University master plan, Villebois and Crescent Village. Earlier experience in planning includes assisting with CEQA Environmental Impact Reports, and transportation planning studies.

Eric was a key part of SERA’s team for the new Aquatics Addition to East Portland Community Center, which recently was designated LEED® Platinum. He is also managing Southern Oregon University’s Master Plan Update and the Wilder community master plan, located in Newport, Oregon. Mr. Ridenour has served as co-chair of the Portland Branch of Cascadia Region Green Building Council. He holds a Masters in Architecture from the University of Oregon and a B.A. in Environmental Studies from the University of California, Santa Cruz.

Materials: The required readings for the class will come from four sources:
- A required subscription to the web site BuildingGreen.com, which includes the journal Environmental Building News. Information on accessing this information will be provided at the first class meeting.
- A course packet, with readings from selected sources (available at Clean Copy)
- A text booklet: Engineering a Sustainable World, by Interface Engineering – a case study of the LEED Platinum OHSU Health and Wellness Center in Portland’s South Waterfront district (print copies available at cost from Clean Copy – order in advance - or non-print PDF will be provided by professor)
- Additional, non-subscription web-based articles, as listed in the syllabus. Additional readings are also recommended for a deeper understanding of each major topic.
**Class Requirements:** 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. One or two brief sketch projects will also be assigned.

*Participation:* Active 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. Attendance in class sessions is expected. In particular, missing more than two sessions will result in a reduced grade.

*Response to Readings:* Students are asked to keep notes on readings. These do not need to be long, but are intended to be a useful resource for your own future reference. They can be in the form of a synopsis, or questions and thoughts provoked by the readings, or both. They will be collected periodically during the course and evaluated for general conformance with this requirement, though not graded on content *per se*. Acceptable formats include: a paper notebook dedicated to this task, emailed notes or a blog-type format.

*In-class exercises:* One or two in-class exercises will be assigned, to illustrate concepts and engage problem-solving skills.

*Case Study:* The goal of the case study assignment is for each student to understand the opportunities, constraints and trade-offs involved in a green building project. Both the specific systems and the team structure that contributed to the project should be discussed. To the greatest extent possible, case studies must include original research*, such as interviews with project team members, review of post-occupancy data, etc.

Case studies will be due at the final class meeting. Case studies will be presented briefly by students during the final exam period, in PowerPoint or other approved digital format. A complete written report will also be due at that time.

**Recommended case studies:** A list of potential case studies will be provided, and certain projects will be excluded from study due their extensive study in published works and/or course materials. Projects for which the student has access to members of the project team would be most advantageous. Projects from other U.S. regions are acceptable; in these cases, provide basic climate data and other distinguishing characteristics that would affect major design decisions.

Despite the strong technical examples set by projects from abroad, case studies for this course must be drawn from the U.S., due to the unique economic factors of development here. Completed, occupied projects are heavily preferred; projects which are fully funded and in construction are acceptable.

**Week-by-week Topics and Readings:**
The following pages list the topics to be covered each week, and the associated readings. Green bars start each week’s session. Note that most sessions have two sub-parts with separate reading for each sub-topic, i.e.: 1A & 1B.

*NOTE:* Plagiarism in class projects will be considered grounds for failure of both the project and course.
Valuing Nature: the case(s) for Green Building

Topics
- The Environmental Case
- The Business Case
- The Humane Case
- Green Building: A Brief History

Required Readings
S Alex Wilson, *Making the Case for Green Building*, Environmental Building News, April '05
P *A New View of Real Estate*, Chapter 1, *Green Development*, Rocky Mountain Institute
P Stephen Kellert: *Ecological Challenge, Human Values of Nature & Sustainability in the Built Environment*

Recommended Readings

Cost Factors

Topics
- Capital costs
- Life Cycle Costs
- Net Operating Income
- Externalized costs

Required Readings
W Sieglinde Fuller: Life-Cycle Cost Analysis (LCCA) www.wbdg.org/resources/lcca.php

Recommended Readings
W USGBC/ULI/Real Estate Roundtable handout: *Making The Business Case For High Performance Green Buildings*
https://www.usgbc.org/Docs/Member_Resource_Docs/makingthebusinesscase.pdf

Urban Form and Natural Systems

Topics
- Sprawl and Density
- Urban Form
- Land Use & Infrastructure

Required Readings
P Timothy Beatley: *Land Use & Urban Form: Planning Compact Cities*
S Alex Wilson, *In the Pipeline: District Energy and Green Building*, Environmental Building News, March 2007

Recommended Readings
W Dr. Reid Ewing & Dr. Richard Kreutzer for LEED-ND Core Committee: *Understanding The Relationship Between Public Health And The Built Environment*, especially Introduction and Summary Conclusions

Transportation, Parking And The Car

Topics
- Land use and transportation interface: density and infrastructure
- Parking: role in successful retail / driving incentive; strategies for providing parking

Required Readings
S Alex Wilson, *Sprawl and Health: Are Modern Land-Use Patterns Making Us Sick?*, Environmental Building News, April 2002
P Donald C. Shoup: *The High Cost of Free Parking*, Introduction

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3A Design Strategies and Processes

**Topics**
- Integrated Design
- Eco-Charrette
- Defining a Vision

**Required Readings**

B *Engineering a Sustainable World*: Pages 1-11

**Recommended Readings**

W American Institute of Architects, *Writing the Green RFP* [http://www.aia.org/cote_rfps](http://www.aia.org/cote_rfps)
W Nathan Good: *What is an Eco-Charrette?* BetterBricks [http://www.betterbricks.com](http://www.betterbricks.com)

3B Construction Process & Commissioning

**Topics**
- Key Stages Of The Construction Process
- The Value of Commissioning
- How a green building process differs
- Soft costs v hard, capital v. operating, etc.

**Required Readings**

B *Engineering a Sustainable World*: Pages 36-45

**Recommended Readings**


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4A Site Design Factors

**Topics**
- Solar Orientation
- Wind
- Soils and Hydrology
- Open Space & Habitat

**Required Readings**

S Alex Wilson: *Getting to Know a Place: Site Evaluation as a Starting Point for Green Design*, Environmental Building News, March 1998
P Mark Francis: *Village Homes: Design & Planning Concepts*
Recommended Readings


### 4B Water Systems: Stormwater and Water Use

**Topics**
- Stormwater Management
- Water Efficiency
- Wastewater Treatment

**Required Readings**


B *Engineering a Sustainable World*: Pages 26-30

**Recommended Readings**


### 5A Daylighting for Energy Savings and Enhanced Productivity

**Topics**
- Daylighting Strategies
- Daylighting Controls
- Productivity Benefits

**Required Readings**

W Joel Loveland and New Buildings Institute, *Daylighting 101* [betterbricks.com](http://www.betterbricks.com)

S *Daylighting: Energy and Productivity Benefits* - Environmental Building News, September 1999

S *Shedding Light on Light Quality* - Environmental Building News, March 2008


**Recommended Readings**


### 5B Indoor Air Quality:

**Topics**
- Reducing Indoor Toxins
- Reducing Mold Risks
- Ventilation

**Required Readings**


**Recommended Readings**

S Alex Wilson: *Air Filtration in Buildings*, EBN, October 2003

S Alex Wilson: *Radon and Other Soil Gases: Dealing with the Hazards from Below*, EBN, July 1998
**Energy: Efficiency & Renewable Production**

**Topics**
- Building Efficiency: Building Envelope
- Building Efficiency: Systems
- Renewable Energy: Green Tags, District Systems, On-Site, & Building-Integrated

**Required Readings**
- S
- W BetterBricks: *Enclosure Systems Design Guide*
  
  betterbricks.com/graphics/assets/documents/DesignSystemEnvelopguideline_pa.pdf
- W BetterBricks: *Which Glass Should I Use? Sorting It All Out*
  
- S Jessica Boehland with Nadav Malin: *Expanding the Engineers’ Comfort Zone: Working with Adaptive Thermal Comfort*, EBN, July 2004
- B

**Recommended Readings**
  
- Alex Wilson: *In the Pipeline: District Energy and Green Building*, EBN, March 2007
- Alex Wilson: *Insulation: Thermal Performance is Just the Beginning*, EBN, Jan. 2005

**Design Briefs**, Energy Design Resources:

http://www.energydesignresources.com/publication/db

**Environmental Aspects of Materials Selection**

**Topics**
- Factors in Materials Selection: Recycled Content, Source Location, Methods of Production, End-of-Life Disposal, Toxicity, etc.
- Prioritizing Issues: Life Cycle Analysis, Precautionary Principle
- The Problem of Greenwash
- Air Quality

**Required Readings**
- S *Establishing Priorities with Green Building* EBN
W Joe Thornton, Ph.D.: Environmental Impacts of Polyvinyl Chloride (PVC) Building Materials  
http://www.healthybuilding.net/pvc/ThorntonPVCSummary.html


Certification: Overview of major systems

Topics
- LEED & LEED-ND
- EarthAdvantage
- EnergyStar and HERS
- Residential GreenBuild Programs

Required Readings

Certification: Overview of major systems

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- EarthAdvantage
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- Residential GreenBuild Programs

Required Readings
W USGBC: LEED-NC Version 3.0  
S Nadav Malin: Green Globes Emerges to Challenge LEED, EBN, March, 2005
W EarthAdvantage Program: Certification  
http://www.earthadvantage.com/certification
W A Comparison of the American Forest & Paper Association’s Sustainable Forestry Initiative & the Forest Stewardship Council’s Certification System  
http://www.greenpressinitiative.org/documents/SFIvs.FSC.pdf

Recommended Readings
W Energy Star National Builder Option Package  
www.energystar.gov/ia/partners/blrs_lenders_raters/downloads/PerfPathTRK_060206.pdf
W Home Energy Ratings: A Primer  
http://www.resnet.us/ratings/overview/resources/primer/default.htm
W American Lung Association: Health House Program, Builder Guidelines  
W Smart Communities Network: Community Green Building Programs  
S Allyson Wendt: Homes Get Their Own LEED, EBN, December, 2007

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Valuing Green & Metrics

- Studies of the Costs of Green Strategies
- Documented Benefits of Green
- Cost-control Strategies
- Sharing the costs: Green Leases

Required Readings
S Alex Wilson: Productivity and Green Buildings, EBN, October 2004
W Institute for Market Transformation: Recognition Of Energy Costs And Energy Performance In Commercial Property Valuation  
http://www.imt.org/PDF%20files/CA%20RGs%20299.PDF
W EXECUTIVE SUMMARY: Davis Langdon, 2007 The Cost of Green Revisited  

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Recommended Readings
W Davis Langdon, *2007 The Cost of Green Revisited*
http://www.betterbricks.com/graphics/assets/documents/RealEstate_Articles_-Energy_Efficient_Economy.pdf

8B Incentives & Constraints

Topics
- BETC
- Federal Tax Credits
- Energy Trust and Utility Incentives
- Permitting Incentives
- Emerging financial mechanisms: Green Leases, EEMs, LEMs, etc.

Required Readings
S Allyson Wendt: *Navigating Incentives and Regulations for Green Building*, Environmental Building News, April 2008
W BETC overview http://www.oregon.gov/ENERGY/CONS/BUS/BETC.shtml
http://www.edcmag.com/CDA/Articles/Column
S David Eisenberg & Peter Yost, *Sustainability and Building Codes*, Environmental Building News, September 2001

Recommended Readings
S Alex Wilson: *USGBC, ASHRAE, and IESNA to Develop a Green Building Standard*, Environmental Building News, March 2006
W DCAT: *Breaking Down the Barriers: Challenges and Solutions to Code Approval of Green Building*
resourcesaver.org/file/toolmanager/O16F24735.pdf

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9 Pushing the envelope
- Architecture 2030
- Net Zero
- Living Buildings
- Natural Building
- Bio-Mimicry

Required Readings
S Mark Piepkorn, *The Natural Building Movement* – EBN, May 2005

Recommended Readings
W Biomimcry.net: *Termite-Inspired Air Conditioning* biomimicry.net/casestudiesB.htm & *Butterfly-inspired Pigment-free Color* biomimicry.net/casestudybutterflycolour.htm
W 2030 Challenge and Implementation Guidelines

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10 Special Class session, TBD

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11 Finals Period: Case Study Presentations