

WEST VALLEY COLLEGE Course Outline

Department: Architecture

Course Number and Title: ARCH 060 - Green Building & Sustainable Design

Length of course in weeks: 16

Units: 3

Total Class Hours/Week: 3

Lecture Hours/Week: 3

Lab Hours/Week:

Grade Type: Grade/Credit/No Credit

Catalog Description: This intermediate level architecture course is a study of green building and sustainable design requirements. Students have opportunities to learn about green building and sustainable design requirements through lectures and case studies. Additional topics include green design strategies: envelope, lighting, heating, cooling, energy production, water and waste.

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Course Outcomes: Student Learning Outcomes

Outcome: Investigate green building solutions appropriate to the given site(s) and environmental context.

Assessment: Final research presentation.

Course Objectives: Upon completion of this course the student should be able to:

1. Describe the green building & sustainable design concepts.
2. Investigate advanced design theory with sustainable architectonic problems.
3. Comprehend properties of green building construction materials and their qualitative input to design.
4. Begin to formulate a personal attitude toward green building design.
5. Describe the requirements for LEED (Leadership in Energy and Environmental Design) certificate achievement and analyze the advantages of being a LEED certified professional.

Assessment: Students in this course will be graded base on the following four categories:

1. **Writing Assignments:** reading report(s)
2. **Problem Solving Demonstrations:** Research and investigation
3. **Skill Demonstrations:** Case studies
4. **Examinations:** Final research presentation

Repeatability: 1 time

Methods of Instruction: Lecture

Lecture Content:

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| 1. Introduction and Overview:
Organization.
Rationale for High-Performance Green Buildings.
Defining Sustainable Construction.
Green Building Progress and Obstacles.
Emerging Directions. | 7.00 % |
| 2. Green Building Foundations:
Background.
Ethics and Sustainability.
Basic Concepts and Vocabulary.
Major Environmental and Resource Concerns.
The Green Building Movement. | 8.00 % |
| 3. Green Building Assessment:
The USGBC LEED Building Assessment Standard.
The LEED Certification Process.
The Green Globes Building Assessment Protocol.
International Building Assessment Systems.
Example of a LEED-NC Platinum Building: The Audubon Center, Debs Park, Los Angeles.
Beyond Today's Building Rating Systems. | 7.00 % |
| 4. The Green Building Process:
Conventional versus Green Building Delivery Systems.
Executing the Green Building Project.
The Integrated Design Process.
Role of the Charrette in the Design Process.
Green Building Documentation Requirements. | 7.00 % |
| 5. Ecological Design:
Design versus Ecological Design.
Historical Perspective.
Contemporary Ecological Design.
Future Ecological Design.
An Emerging View: A Shift from Green Design to Regenerative Design. | 7.00 % |

6. Green Building Systems: 7.00 %
Sustainable Sites and Landscaping.
Land and Landscape Approaches for Green Buildings.
Land Use Issues.
Sustainable Landscapes.
Enhancing Ecosystems.
Stormwater Management.
Heat Island Mitigation.
Light Trespass and Pollution Reduction.
Connection to LEED-NC.
Connection to Green Globes v.1.
7. Energy and Atmosphere: 8.00 %
Building Energy Issues.
High-Performance Building Energy Design Strategy.
Passive Design Strategy.
Building Envelope.
Internal Load Reduction.
Active Mechanical Systems.
Electrical Power Systems.
Innovative Energy Optimization Strategies.
Smart Buildings and Energy Management Systems.
Ozone-Depleting Chemicals in HVAC&R and Fire Suppression.
Connection to LEED-NC.
Connection to Green Globes v.1.
8. The Building Hydrologic System: 7.00 %
Current Building Fixtures and the Energy Policy Act of 1992.
High-Performance Building Hydrologic Cycle Strategy.
High-Performance Building Water Supply Strategy.
High-Performance Building Wastewater Strategy.
Landscaping Water Efficiency.
Connection to LEED-NC.
Connection to Green Globes v.1.
9. Closing Materials Loops: 7.00 %
Issues in Selecting Green Building Materials and Products.
Distinguishing Between Green Building Products and Green Building Materials.
Priorities for Selecting Building Materials and Products.
LCA of Building Materials and Products.
Key and Emerging Construction Materials and Products.
Design for Deconstruction and Disassembly.
Closing Materials Loops in Practice.
Connection to LEED-NC.
Connection to Green Globes v.1.

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| <p>10. Indoor Environmental Quality:</p> <ul style="list-style-type: none"> IEQ Issues. Indoor Environmental Factors. HVAC Systems. Building Materials. Best Practices for IAQ. Managing IEQ During Construction. Connection to LEED-NC. Connection to Green Globes v.1. Part III Green Building Implementation. | <p>8.00 %</p> |
| <p>11. Construction Operations:</p> <ul style="list-style-type: none"> Site Protection Planning. Health and Safety Planning. Construction and Demolition Waste Management. Subcontractor Training. Reducing the Footprint of Construction Operations. | <p>7.00 %</p> |
| <p>12. Building Commissioning:</p> <ul style="list-style-type: none"> Essentials of Building Commissioning. Maximizing the Value of Building Commissioning. HVAC System Commissioning. Commissioning of Nonmechanical Systems. Costs and Benefits of Building Commissioning. Connection to LEED-NC. | <p>5.00 %</p> |
| <p>13. Economic Analysis of Green Buildings:</p> <ul style="list-style-type: none"> General Approach. The Business Case for High-Performance Green Buildings. The Economics of Green Building. Quantifying Green Building Benefits. Managing First Costs. Tunneling through the Cost Barrier. | <p>7.00 %</p> |
| <p>14. The Cutting Edge and Beyond:</p> <ul style="list-style-type: none"> Passive Survivability. Cutting Edge: Case Studies. Articulating Performance Goals for Future Green Buildings. The Challenges. Revamping Ecological Design. Beyond the Cutting Edge: Sustainable Geometries. | <p>8.00 %</p> |

Critical Thinking: Investigate complex green building requirements adequate for unified sustainable design concept.

College Level Required Reading, Writing, and other Outside-of-Class Assignments:

Over a 16 week presentation of the course, three hours per week are required for each unit of credit. Two hours of independent work done out of class are required for each hour of lecture. Outside of the regular class time the students in this class will be doing the following outside of class:

- **Study:** 1.00 additional hour
- **Problem solving activity or exercise:** 1.00 additional hour
- **Practice Skills:** 1.00 additional hour
- **Written work:** 1.00 additional hour
- **Observation/Participation:** 1.00 additional hour
- **Required reading:** 1.00 additional hour

Textbooks:

1. Kibert, Charles J. Sustainable Construction: Green Building Design and Delivery. 2nd ed. Wiley & Sons, 2007. ISBN: 9780470114216
2. Kwok, Alison and Grondzik, Walter. . The Green Studio Handbook. Elsevier, Architectural Press, 2006. ISBN: 9780750680226