University of Southern California  
Construction Management Department  
Spring Semester 2009  
CE-499 (29607)  
Course Syllabus  

please consider the environment prior to printing this email!

Instructor:  
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207 King St, Ste 300  
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Course Title:  
CE-499: Sustainable Design & Construction Practices  

Class Meeting:  
Monday: 6:30pm-9:10pm  

Location:  
KAP 156  

Office Hours:  
Mondays prior to class start time (as-needed)  

Course Description:  
The sustainable design and construction movement has been called the next marketing boom of the new millennium. The US Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) rating system is at the forefront of this movement. In-depth knowledge of the LEED rating system is not only invaluable in reducing environmental impacts but also in developing a long term market share and improving economic performance.

This course is composed of independent study and group exercises with proctored weekly discussions/lectures that will cover the technical requirements of the LEED Green Building Rating System for New Construction & Major Renovations (LEED-NC). Additionally, this course will focus on providing an overview of the knowledge required for taking the LEED Professional Accreditation exam. The course will provide attendees with an understanding of how LEED is being used nationally throughout the design and construction industries to define various levels of sustainable project design, the resources available for successfully achieving LEED project certifications, and a credit-by-credit review of the LEED Green Building Rating System.

Individual and group projects will be administered that identify and move beyond today’s current Green Building strategies to determine the next steps of Green Building. These concepts include: understanding the process of Carbon Footprinting; calculating the embodied energy of building materials during extraction, processing, manufacturing and transportation; cyclical processes in the design and construction industries that have negative environmental impacts; demolition verses deconstruction practices. Synthesizing and recognizing the importance of these key concepts will better prepare course participants with a collective understanding of the design and construction industries and our critical role in reducing our impact on the environment.
The class will cover:

- Introduction to green-building design strategies and benefits
- When and how to use the LEED-NC, CS, CI, EB, ND, & HC Green Building Rating Systems
- Green building resources and references
- Advancing Green building technologies and innovations
- Construction industry’s sustainable field best practices
- Real-life project examples of achieving LEED certification
- Identifying the steps of integrating sustainability with Virtual Building and Building Information Modeling (BIM) practices
- Carbon footprinting of construction and related activities
- Understanding and measuring the embodied energy of construction materials
- Review and preparation for the LEED Professional Accreditation examination (**Please note that the LEED AP exam is offered only thru the USGBC. Details will be covered in class and are available at the LEED Accreditation web page [www.gbc.org](http://www.gbc.org)).

**Required Course Texts:**

- **LEED Reference Guide for New Construction and Major Renovations (LEED-NC) Version 2.2**, US Green Building Council. **NOTE:** The LEED Reference Guide is ONLY available online through [www.USGBC.org](http://www.USGBC.org) and must be pre-ordered prior to class start date. Allow for a 3wk delivery time. Students are expected to be familiar with this text prior to the first day of class!

- **Understanding Sustainable Construction Practices and the (LEED®) Green Building Rating System**, Mike Montoya, (electronic version will be posted on Blackboard) – see copyright notice below:

**COPYRIGHT NOTICE:** By registering for this class you agree to the following media use agreement. All electronic files posted on Black Board are for in class use only. Electronic files may be viewed remotely on-line using Black Board only. Any other use is strictly prohibited including downloading, printing, or any other use outside of the classroom. Any violation is a copyright infringement and will be considered cheating resulting in an automatic failing grade. Fraudulent use of this material may result in expulsion or criminal charges.

**Read this syllabus completely before registering for this course. By registering for this class you commit to the following:**

- Be actively engaged in classroom discussions
- Complete reading assignments before classroom discussion
- Come to each seminar prepared to actively discuss the specific topic
- Complete laboratory assignments on-time and to an acceptable level of quality
- Attend ALL scheduled seminars
To participate in this course you must attend all scheduled seminars. One unexcused absence will result in a drop from the course.

**Grading:**
- Labs / Homework: 20%
- Group Projects: 15%
- Quizzes: 20%
- Midterm Exam: 20%
- Final Exam: 20%
- Class participation & attendance: 5%

**Successfully passing the national LEED AP examination will be 10% extra credit**

**Course Readings:**
The attached Course Outline includes the chapters, from the assigned texts, that will be covered in each class period. Additional reading assignments may be assigned in class. All assigned reading must be completed prior to the corresponding class period to facilitate class discussion and the student’s overall understanding of the subject matter. A one paragraph (½-page max) “reading review” or Quiz will be due/conducted at the beginning of each class.

**Academic Integrity**
1. The University, as an instrument of learning, is predicated on the existence of an environment of integrity. As members of the academic community, faculty, students, and administrative officials share the responsibility for maintaining this environment. Faculties have the primary responsibility for establishing and maintaining an atmosphere and attitude of academic integrity such that the enterprise may flourish in an open and honest way. Students share this responsibility for maintaining standards of academic performance and classroom behavior conducive to the learning process. Administrative officials are responsible for the establishment and maintenance of procedures to support and enforce those academic standards. Thus, the entire University community bears the responsibility for maintaining an environment of integrity and for taking appropriate action to sanction individuals involved in any violation. When there is a clear indication that such individuals are unwilling or unable to support these standards, they should not be allowed to remain in the University.” (Faculty Handbook, 1994:20)

2. Academic dishonesty includes: (Faculty Handbook, 1994: 21-22)
   a. Examination behavior – any use of external assistance during an examination shall be considered academically dishonest unless expressly permitted by the teacher.
   b. Fabrication – any intentional falsification or invention of data or citation in an academic exercise will be considered a violation of academic integrity.
   c. Plagiarism – the appropriation and subsequent passing off of another’s ideas or words as one’s own. If the words or ideas of another are used, acknowledgment of the original source must be made through recognized referencing practices.
   d. Other Types of Academic Dishonesty – submitting a paper written by or obtained from another, using a paper or essay in more than one class without the teacher’s express permission, obtaining a copy of an examination in advance without the knowledge and consent of the
teacher, changing academic records outside of normal procedures and/or petitions, using another person to complete homework assignments or take-home exams without the knowledge or consent of the teacher.

3. The use of unauthorized material, communication with fellow students for course assignments, or during a mid-term examination, attempting to benefit from work of another student, past or present and similar behavior that defeats the intent of an assignment or mid-term examination, is unacceptable to the University. It is often difficult to distinguish between a culpable act and inadvertent behavior resulting from the nervous tensions accompanying examinations. Where a clear violation has occurred, however, the instructor may disqualify the student’s work as unacceptable and assign a failing mark on the paper.

Statement for students with disabilities:
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. Your letter must be specific as to the nature of any accommodations granted. DSP is located in STU 301 and is open 8:30 am to 5 pm, Monday through Friday. The telephone number for DSP is (213) 740-0776.

Class Participation:
Students are REQUIRED to attend all seminars and group meetings both physically and mentally. Students will be graded on attendance and active participation in the assignments and discussions. Students are expected to maintain an acceptable level of professionalism that exemplifies courtesy and mutual respect in the classroom and groups at all times. Discourteous and disruptive behavior will not be tolerated. The following specific guidelines for proper classroom conduct are expected at all times. Students who violate these rules will be asked to leave the room.
- Always arrive on time
- Do not talk or whisper with fellow students during lecture or any other inappropriate time
- Do not read newspapers, books, or do homework during lectures
- No cell phones/pagers
- Do not eat or sleep during class
- At the end of the period do not cause a disturbance by packing up your things or by starting to leave before the class is dismissed

Guest Speaker Presentations:
Guest speakers that are invited to speak in our course are highly respected in their lines of work in the design and construction industries. Come prepared to become actively engaged in the conversations. These are the experts and much can be gained from their experiences. They deserve our utmost respect. These sessions can also be used as additional networking and employment resources for internships and full-time employment. Come prepared.

LEED AP Examination:
As noted above, 10% extra credit will be rewarded to any student that successfully completes and provides the appropriate documentation of receiving a passing score on their LEED AP exam. I strongly suggest that you make every effort to take advantage of this valuable opportunity. This is a professional accreditation that you will have for the
Employers see it as a strong advantage credential when looking to recruit and hire students out of school. The course is geared toward preparing students to have the necessary tools to pass this exam. Study sessions, sample exams, and other study tools will be provided throughout the semester as part of the course. All USGBC and GBCI costs will be borne by the students. Exam sign-up is done through any Prometric testing site (www.prometric.com) and is the sole responsibility of the student. More details will be addressed in class.

As an additional resource, my assistant Megan White, Sustainability Coordinator at Webcor Builders is available for study support. Webcor hosts several LEED training and study group sessions on a regular basis. Make every effort to maximize the use of these tools to your advantage. Megan’s contact details below:

Megan White, LEED AP  
Sustainability Coordinator  
Webcor Builders  
207 King St, Ste 300  
San Francisco, CA 94103  
415.978.1040  
mwhite@webcor.com

Off-Campus Field Trips:  
As part of the learning process, our class will visit 2-3 construction project sites that are currently in various stages of construction. These projects are applying for LEED certification within the LA area and will provide a greater level of understanding of the in-class/text education and discussions. It is advised that you make every effort possible to attend these informative meetings as they provide detailed application of the "how-to" LEED process on real projects. Class carpooling efforts should be made as these urban high-density project sites have limited parking (and it is costly).

Extra Credit Opportunities:  
Several extra credit opportunities will be presented throughout the course including, but not limited to, relevant industry conference attendance, product research work, identifying new opportunities for our class’s educational experience, etc. If you thoroughly and intelligently present something of interest to me and provide the reason why there is educational value that may merit an extra credit opportunity, I will be open to discussion.

Laboratory Assignments:  
Each lab assignment will be evaluated based primarily on level of accuracy, detail, student understanding, and presentation. Sketches may be simple hand-drawings or prepared with electronic medium but must be legible and completely address the specific topic. Executive summaries and written descriptions are required in each lab assignment and should be no more than ½ page, and drawings are limited to one 8 ½ x 11 page per assignment. All labs must be submitted electronically by their assigned due date. “Hand” drawings are encouraged but must be scanned and submitted electronically. All lab assignments are required to be submitted prior to class by Monday at 6:30pm on the due date via Black Board. Any assignment emailed to my work or USC email address will not be accepted for credit.

To effectively answer each question, research is required in addition to the required reading assignments; the internet is a great source of information for these assignments.
For credit you must electronically submit your drawing/description along with a brief executive summary.

For each lab read the referenced text section, evaluate each of the lab assignment items, and answer the question(s). It is likely that additional research will be necessary to completely respond to each question. You must specifically reference the source of any outside information in your lab submittal. All answers must be your own work, do not “cut-and-paste” from the internet or copy from any source!! Failure to complete and submit individual and original work will not be accepted and counted as 0 credit. Plagiarism will not be tolerated and handled directly with the University accordingly.

Homework and lab assignments are to be turned in at the beginning of the class on the date due. Late homework assignments will not be accepted. Failure to turn in a homework assignment on-time will result in a grade of 0 for that assignment. Additional in-class individual and group assignments and quizzes may be assigned.

For full credit each lab must include:
1. Name, Lab number, date, class number
2. Short Executive Summary (with publication request if applicable)
3. Drawing or Description required
4. Cited information sources

Lab 1
The USGBC has several building certification programs for encouraging sustainable design and construction practices in different types of buildings, for example LEED - NC for New Construction and major renovation of commercial buildings. After reading the USGBC manual assignment and referencing the web site, list each of the building certification programs available or in the process as pilot development (you must visit www.USGBC.org to get the most up to date list), along with a brief description of each. Your descriptions should include citing specific project examples, locations, building type, square footage, proposed value, etc for each rating systems.

Lab 2
Provide a simple sketch (hand drawings are acceptable but must be submitted electronically) that best illustrates any TWO of the following sections from your assigned reading:
- Any illustration of a soil remediation technique including, but not limited to, bioventing, soil flushing, or solar detox.
- Any illustration of a heat island effect strategy including, but not limited to, landscaping/structure shading of low SRI surfaces, high reflectance materials for hardscaping and roofs, or vegetated surfaces for roofing, hardscape and/or paving.
- Any illustration of light pollution remediation
- Any illustration of the effects of building orientation

Lab 3
Provide a simple sketch (hand drawings are acceptable but must be submitted electronically) that best illustrates any TWO of the following sections from your assigned reading:
- Illustration of any BMP including, but not limited to, basins, bio-swales, porous paving, grass paving;
- Any illustration of a vegetative roof;
• Any illustration of rainwater harvesting; or
• Any illustration of greywater harvesting including, but not limited to, mechanical or natural processes.

Lab 4
Provide a simple sketch (hand drawings are acceptable but must be submitted electronically) that best illustrates TWO of the following concepts from your assigned reading:
• Passive solar heating or cooling
• Geothermal heat generation
• Solar heat gain
• Thermal mass (heating and cooling)
• Sustainable power generation including, but not limited to, solar, geothermal, wind, tidal flux, etc.

Lab 5
Provide a description that best illustrates ONE of the following sections from your assigned reading. Your answer must include a description, example and consider/discuss quality, cost, and environmental impact (positive and negative.)
• Use of recycled content building materials
• Rapidly renewable building material products
• FSC Lumber
• Composite/alternative material use

Lab 6
Provide a simple sketch (hand drawings are acceptable but must be submitted electronically) using the plans (drawings will be distributed in class) of a passive ventilation strategy. All ideas are welcome but they must consider practicality. Your answer must include the prevailing wind direction in your consideration as well as the effects of heat gain/loss, location of windows to maximize air flow, etc.

Lab 7
Download the LEED for new construction “v2.2 Credit Checklist” from the USGBC web page. Using the preliminary plans (drawings will be distributed in class) and evaluate each potential credit. “Maybe’s” are okay but must include a discussion of why it is or is not possible and recommendations/ideas for achieving credit for each point. The credit evaluations must also include a discussion of viable cost implications. Further in-class instruction prior to this assignment will be addressed.

Lab 8
Develop a Construction LEED manual that identifies project consultant responsibility for LEED credits on a LEED project (projects will be identified in class). For example, an Architect would be responsible for submitting documentation for SS Credit #1; a Contractor will be responsible for submitting the proper documentation for MR Credit 2.1& 2.2, etc. Identify the list of credits and accurately associate the correct consultants by each credit. (On particular credits there maybe multiple parties responsible for submission – note that when applicable). Your LEED checklist and narratives must also identify what information will be needed for each credit submission to qualify for LEED credits. This includes the supporting LEED documentation and calculation guides, material specifications, letters from subs and suppliers that identify materials location and content, etc. We will setup a sample LEED-online project where each group will be
Lab 9
Carbon Footprint of a building material; students will be responsible for researching an appropriate building material, how it is processed, manufactured, transported and installed and identify an accurate carbon metric for that product and embodied energy throughout all processes mentioned above. Further in-class instruction prior to this assignment will be addressed.

Lab 10 - Group Project
Carbon material calculator and embodied energy measurement. Calculating tools that allow designers and builders to identify Details to be discussed and further developed in class. You will be responsible for identifying a project as a group (no more than 3 people per group) and find their plans and specifications that provide enough level of details to examine. Further in-class instruction prior to this assignment will be addressed.
**Course Outline** - Tentative schedule maybe readjusted without advanced notice.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic Description</th>
<th>Reading Assignments</th>
<th>Due</th>
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<tbody>
<tr>
<td>1</td>
<td>1/12</td>
<td>Forward and Introduction - Group Project Review</td>
<td>Course Introduction, LEED Reference Manual Introduction</td>
<td>Lab Intros</td>
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<tr>
<td>2</td>
<td>1/19</td>
<td><strong>MLK Holiday - No Class</strong></td>
<td>LEED Reference Manual</td>
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<tr>
<td>3</td>
<td>1/26</td>
<td>Sustainable Sites</td>
<td>SS Prereq 1, SS Credits 1-8</td>
<td>Lab 1</td>
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<td>4</td>
<td>2/2</td>
<td><strong>QUIZ #1</strong> Water Efficiency</td>
<td>WE Credit 1.1-3.2</td>
<td>Lab 2</td>
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<td>5</td>
<td>2/9</td>
<td>Energy and Atmosphere</td>
<td>EA Prereq 1-3, EA Credit 1-6</td>
<td>Lab 3</td>
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<td>6</td>
<td>2/16</td>
<td>President's Day Holiday - No Class</td>
<td>Text TBD</td>
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<td>7</td>
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<td><strong>QUIZ #2</strong> Materials and Resources</td>
<td>MR Prereq 1, MR Credit 1-7</td>
<td>Lab 4</td>
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<td>8</td>
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<td><strong>Guest Speaker: Chris Plue (Webcor - VP of Concrete)</strong></td>
<td>Text TBD</td>
<td>Lab 5</td>
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<td>10</td>
<td>3/23</td>
<td>Materials' Embodied Energy Analysis, Carbon Calculation</td>
<td>Text TBD</td>
<td>Lab 6</td>
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<td>Indoor Environmental Quality Part I</td>
<td>EQ Prereq 1-2, EQ Credit 1-4.4</td>
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<td><strong>QUIZ #3</strong> Indoor Environmental Quality Part II</td>
<td>EQ Credit 5-8.2</td>
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<td>Innovation &amp; Design, Role of the LEED AP</td>
<td>ID Credit 1-2</td>
<td>Lab 9</td>
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<td>14</td>
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<td>**Guest Speaker: Frank Haase - VB Project Manager Carbon Calculation</td>
<td>USGBC.org, LEED, GBCI.org, and LEED AP</td>
<td>Lab 10 - Group Project</td>
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<td><strong>QUIZ #4</strong> Life-Cycle Analysis</td>
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