

## **ARCH 579: Sustainable Building and Environment using LEED Metrics**

**INSTRUCTOR** : **Dr. Joon-Ho Choi**, PhD, LEED AP  
**Assistant Professor**  
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### **COURSE INFORMATION**

Green buildings and sustainable environment have been rapidly gaining acceptance in today's building industry. Environmental issues including energy consumption, gas emission, energy resource depletion, and land use are driving building designers and engineers to re-think conventional architectural design and construction processes, and to look to more eco-friendly practices.

This course will provide fundamental knowledge of sustainable building concepts, current environmental design building rating systems (for example, LEED), building performance and diagnostic metrics, as well as referenced standards related to sustainable design. The course will benefit greatly from the large number of best practices in the U.S. as case studies, and will adopt practical research experiments in building indoor environmental quality, focusing on thermal, air, lighting, and acoustic qualities. It will also introduce technical and quantitative methods for passive design strategies for a zero energy building. This practice-based course will equip students with analytical skills to develop best green design and technology combinations depending on environmental characteristics of a building site. Upon completion of the course, students will be prepared to take the LEED Accredited Professionals / Green Associate Exam, which is rapidly becoming the standard of recognition for green building professionals.

**COURSE TIME** : 9:00 AM to 11:50 AM (TUE)

**CLASSROOM** : WAH 212

**OFFICE HOURS** : 12:00PM to 1:00 PM (TUE)

**SCHEDULE of CLASSES:** See the following pages.

**ASSIGNMENTS** : Assignment and course project are due Tuesday before the class. Late submission will be marked accordingly: 20% discount per day on grade).

**GRADING** : Final grade averages shall be determined using a weighted average of all required work. The weight distribution is as follows:

- Quizzes (10%)
- Mid-term (30%)
- Final-term (30%)
- Assignments (10%)
- Course projects (15%)
- Attendance (5%)

## **GRADING POLICY**

: WAH 212

1. General rule:
  - a.  $4.0 = 97.0 - 100 = A+$  Students in this range will get an A and commendation (the university does not give A+)
  - b.  $4.0 = 93.0 - 96.9 = A$
  - c.  $3.7 = 90.0 - 92.9 = A-$
  - d.  $3.3 = 87.0 - 89.9 = B+$
  - e.  $3.0 = 83.0 - 86.9 = B$
  - f.  $2.7 = 80.0 - 92.9 = B-$
  - g.  $2.3 = 77.0 - 79.9 = C+$
  - h.  $2.0 = 73.0 - 76.9 = C$
  - i.  $1.7 = 70.0 - 72.9 = C-$
  - j.  $1.3 = 67.0 - 69.9 = D+$
  - k.  $1.0 = 63.0 - 66.9 = D$
  - l.  $0.7 = 60.0 - 62.9 = D-$
  - m.  $0 = <60.0 = F$
2. Exception: The instructor reserves the right to adjust the low end weighted average cut-off score based upon the statistical distribution of the semester averages for A, B, or C final grades. For instance, if there is a large gap in the weighted averages at 88%, then the instructor may decide to award an A grade to all students above that value. This is done at the instructor's discretion and in no way should be constructed to mean that it will be done each and every semester. If a student wishes to earn a particular final grade then the student should focus on earning the minimum weighted averages described in the general rule.

**EXTRA-CREDITS:** There will be extra credit problems, assignments or participations. These extra problems or assignments will help those students who feel that there is a need to improve their grade by performing some extra work.

## **TEXTBOOKS :**

- “**Guide to the LEED Green Associate Exam**”, Michelle Cottrell, Wiley, 1st Edition
- “LEED 2009 for New Construction and Major Renovations”, USGBC. (*Available in <http://www.usgbc.org/ShowFile.aspx?DocumentID=5546>*)
- *Additional papers and handouts will be provided.*
- *References:*
  - “*Mechanical and Electrical Equipment for Buildings*” by Walter T. Grondzik, Alison G. Kwok, Benjamin Stein and John S. Reynolds (11<sup>th</sup> Edition), Wiley.
  - “*Guide to Green Building Rating Systems*” by Linda Reeder (1<sup>st</sup> edition), Wiley.
  - “*Green Building: Principles and Practices in Residential Construction*”, Abe Kruger, Carl Seville (1<sup>st</sup> edition), Delmar Cengage Learning.
  - “*Sustainable Construction: Green Building Design and Delivery*”, Charles Kibert (3<sup>rd</sup> edition), Wiley.

## **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 (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

## **STATEMENT ON ACADEMIC INTEGRITY**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be

submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: <http://www.usc.edu/dept/publications/SCAMPUS/gov/>. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>.

**ARCH 579 SCHEDULE OF CLASSES (Tentative)**

<b>Week</b>	<b>Description</b>	<b>Quiz</b>
<b>1 (Jan. 14)</b>	Introduction to the USGBC and other environmental building rating systems <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 1 to 5 (p.1-48)</i></li> <li>o <i>USGBC, Introduction section (p. i – xv)</i></li> </ul>	
<b>2 (Jan. 21)</b>	<i>Project #1</i>	
<b>3 (Jan. 28)</b>	Site use problems/issues, Strategies and technologies, Case studies (1) <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 6 (p. 49-54)</i></li> <li>o <i>USGBC, Sustainable Sites (p. 1-10)</i></li> <li>o <i>Grondzik, Chapter 3 (p. 49-56)</i></li> <li>o</li> </ul>	#1
<b>4 (Feb. 4)</b>	Site use problems/issues, Strategies and technologies, Case studies (2) <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 6 (p. 55-70)</i></li> <li>o <i>USGBC, Sustainable Sites (p. 11-20)</i></li> <li>o <i>Data collection of LEED project building performance and adopted technologies</i></li> </ul> Water use and conservation, Strategies and technologies, Case studies <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 8 (p. 71-82)</i></li> <li>o <i>USGBC, Water Efficiency (p. 21-28)</i></li> </ul>	#2
<b>5 (Feb. 11)</b>	<i>Guest Lecture #1</i> Energy use and conservation, Strategies and technologies, Case studies (1) <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 8 (p. 83-89)</i></li> <li>o <i>USGBC, Energy and Atmosphere (p. 29-34)</i></li> <li>o <i>Grondzik, Chapter 4.3 and 4.4.</i></li> </ul> <i>Project #1 due.</i>	#3
<b>6 (Feb. 18)</b>	Site-Visit (TBA) / Project #2 overview	#4
<b>7 (Feb. 25)</b>	<i>Guest Lecture #2</i> Energy use and conservation, Strategies and technologies, Case studies (2) <i>Reading:</i> <ul style="list-style-type: none"> <li>o <i>Cottrel, Chapter 8 (p. 83-89)</i></li> <li>o <i>USGBC, Energy and Atmosphere (p. 35-46)</i></li> <li>o <i>Grondzik, Chapter 9 (p. 325-330)</i></li> </ul>	

Week	Description	Quiz
<b>8</b> <b>(Mar. 4)</b>	<b>Mid-term</b>	
<b>9</b> <b>(Mar. 11)</b>	<i>Guest Lecture #3</i> Improved Indoor Air Quality Strategies and technologies, Case studies (1) <i>Reading:</i> <ul style="list-style-type: none"> <li>○ <i>Cottrel, Chapter 10 (p. 121-127)</i></li> <li>○ <i>USGBC, Indoor Environmental Quality (p. 57-73)</i></li> <li>○ <i>Grondzik, Chapter 5 (p. 115-124)</i></li> <li>○</li> </ul>	
<b>10</b> <b>(Mar. 18)</b>	Spring break	
<b>11</b> <b>(Mar. 25)</b>	Improved Indoor Air Quality Strategies and technologies, Case studies (2) <i>Reading:</i> <ul style="list-style-type: none"> <li>○ <i>Cottrel, Chapter 10 (p. 128-136)</i></li> <li>○ <i>USGBC, Indoor Environmental Quality (p. 74-82)</i></li> <li>○ <i>Grondzik, Chapter 5 (p. 125-149)</i></li> </ul>	#5
<b>12</b> <b>(Apr. 1)</b>	<i>Guest Lecture #4</i> Materials use and conservation, Strategies and technologies, Case studies (1) <i>Reading:</i> <ul style="list-style-type: none"> <li>○ <i>Cottrel, Chapter 9 (p. 105-112)</i></li> <li>○ <i>USGBC, Materials and Resources (p. 47-52)</i></li> </ul>	#6
<b>13</b> <b>(Apr. 8)</b>	Site-Visit (TBA)	
<b>14</b> <b>(Apr. 15)</b>	<i>Guest Lecture #5</i> Materials use and conservation, Strategies and technologies, Case studies (2) <i>Reading:</i> <ul style="list-style-type: none"> <li>○ <i>Cottrel, Chapter 9 (p. 113-120)</i></li> <li>○ <i>USGBC, Materials and Resources (p. 53-56)</i></li> </ul>	#7
<b>15</b> <b>(Apr. 22)</b>	Financial benefits of LEED projects & Wrap-up	#8
<b>16</b> <b>(Apr. 29)</b>	Final project presentations	
<b>17</b> <b>(May. 13)</b>	<b>Final-exam (8-10 AM)</b>	