Course Outline

CVEEN 5500– Sustainable Materials (Spring 2020)
Tue/Thu 12:25 – 1:45 pm MEB Room 2325


Instructor: Pedro Romero Ph.D., P.E. TA: None ☹
MCE Room 2131
Ph: 801-587-7725
pedro.romero@utah.edu (Canvas email will have a delayed response)

Office Hours: T Th 2:00 – 3:00 pm
I have an open-door policy.
Do not wait for office hours, if I’m in the office please stop and say hi.

Course Description: This course presents the concepts necessary to evaluate, select, and design materials in civil engineering applications to be energy-, cost-, and eco-efficient while durable and high performing.

Prerequisites: CVEEN 3510 or equivalent.

Class Schedule (Tentative)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Subject1</th>
<th>Reading2</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01/07</td>
<td>Introductions, definitions</td>
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<tr>
<td></td>
<td>01/09</td>
<td>Scales, HDI</td>
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<tr>
<td>2</td>
<td>01/14</td>
<td>Activity: Our Common Future3</td>
<td></td>
<td>Chapters 1 - 3</td>
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<tr>
<td></td>
<td>01/16</td>
<td>Consumption, population</td>
<td>Chapter 1</td>
<td>Homework #1</td>
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<tr>
<td>3</td>
<td>01/21</td>
<td>Elemental Analysis, Equilibrium</td>
<td>Chapter 2</td>
<td></td>
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<tr>
<td></td>
<td>01/23</td>
<td>CO2 equivalency, combustion</td>
<td></td>
<td>Homework #2</td>
</tr>
<tr>
<td>4</td>
<td>01/28</td>
<td>Law, Ethics, and Sustainability</td>
<td>Chapter 3</td>
<td></td>
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<tr>
<td></td>
<td>01/30</td>
<td>Water Cycle</td>
<td>Chapter 4</td>
<td>Homework #3</td>
</tr>
<tr>
<td>5</td>
<td>02/04</td>
<td>Air Quality, Human Impacts</td>
<td>Chapter 5</td>
<td>Case Study Topic Selection</td>
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<tr>
<td></td>
<td>02/06</td>
<td>Carbon Cycle</td>
<td>Chapter 6</td>
<td>Homework #4</td>
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<tr>
<td>6</td>
<td>02/11</td>
<td>Traffic Congestion</td>
<td></td>
<td>Paper Topic Selection</td>
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<tr>
<td></td>
<td>02/13</td>
<td>Public Transportation</td>
<td></td>
<td>Homework #5</td>
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<tr>
<td>7</td>
<td>02/18</td>
<td>Technology in Transportation</td>
<td></td>
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<tr>
<td></td>
<td>02/20</td>
<td>Materials Resources &amp; Selection</td>
<td>Chapter 7</td>
<td>Homework #6</td>
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<tr>
<td>8</td>
<td>02/25</td>
<td>Review</td>
<td></td>
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<tr>
<td></td>
<td>02/27</td>
<td>Exam #1</td>
<td></td>
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<tr>
<td>9</td>
<td>03/03</td>
<td>Material Energy Efficiency</td>
<td>Chapter 8</td>
<td>Case study partial submission</td>
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</table>
1. The topics are subject to change at the instructor’s discretion
2. Readings refer to Striebig, Ogundipe, and Papadakis Textbook
4. Homework due right after topics are discussed to prepare for exam
5. Attending a conference on Sustainability and writing a 1-page summary will result in 2-points

Other Optional Textbooks

- Kibert, C.J.: Sustainable Construction: Green Building Design and Delivery, 3rd Ed.
- Sarte, S.B.: Sustainable Infrastructure: The Guide to Green Engineering and Design

LESSON PREPARATION

Students are expected to come prepared to class by having read the book IN ADVANCED so they can follow the lecture and ask relevant questions. Lecture notes might only provide a brief summary and some examples.

Class participation is expected! Students are encouraged to participate with questions and share their own experiences.
HOMEWORK

Homework is given to expand the topics covered in class; in some occasions, further reading/research might be required so do not expect to find all the answers in the notes. Students are encouraged to form study groups to try and solve the homework. It is acceptable to send a member to ask questions or seek help from the instructor; however, everyone must be an active participant and turn in their own homework. Be careful of using the same spreadsheet. Also, any item copy from the internet must be referenced properly or no credit will be given. Copying someone else homework, using solutions from previous classes, the web, or from the solution manual is considered unethical and will be treated as academic dishonesty. Please review the definitions of academic misconduct shown on this document.

Homework is due BEFORE the beginning of class on the day indicated on the class schedule (Thursday). The homework must be turned online into Canvas as a single file. The following files are accepted: pdf, doc, and docx. Paper submissions or even e-mail submissions will not be accepted. Once class starts, the homework will be considered late and will be graded up to a maximum value of 50% as long as it is turned in within the next 48 hours. No homework will be accepted after that. No excuses will be accepted so please do not ask! Note that Canvas clearly indicates the date and time the submission was turned in, it is your responsibility to ensure it was properly turned in.

When appropriate, the homework must follow the department’s format. In all cases you must clearly separate each problem either by starting at a new page (preferred) or by having a thick line across the page. Highlight, circle, or somehow mark your final answer.

GRADING

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>Grade</th>
<th>Cut-Off</th>
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<tbody>
<tr>
<td>2 Exams</td>
<td>26 percent</td>
<td>A</td>
<td>&gt; 95</td>
</tr>
<tr>
<td>n Online quizzes</td>
<td>4 percent</td>
<td>A-</td>
<td>&gt; 90</td>
</tr>
<tr>
<td>9 Homework</td>
<td>21 percent</td>
<td>B+</td>
<td>&gt; 87</td>
</tr>
<tr>
<td>1 Final Exam (note 1)</td>
<td>19 percent</td>
<td>B</td>
<td>&gt; 85</td>
</tr>
<tr>
<td>1 Case Study (group)</td>
<td>15 percent</td>
<td>B-</td>
<td>&gt; 80</td>
</tr>
<tr>
<td>1 Participation</td>
<td>4 percent</td>
<td>C+</td>
<td>&gt; 77</td>
</tr>
<tr>
<td>1 Material Research Paper</td>
<td>11 percent</td>
<td>C</td>
<td>&gt; 74</td>
</tr>
<tr>
<td>Total</td>
<td>100 percent</td>
<td>C-</td>
<td>&gt; 70</td>
</tr>
<tr>
<td>1 Extra credit (note 2)</td>
<td>2 percent</td>
<td>D+</td>
<td>&gt; 66</td>
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Notes:
1. The final exam will be comprehensive. If a student has accumulated enough points (as a percent of assigned work) to earn an A in the class, he or she can opt out of the final provided that the grades on all tests is 90 or above and there are no missing assignments. You will be informed of your eligibility on the last day of classes.
2. 2 points of extra credit may be earned if you must attend a talk/presentation related to sustainability and then writing a 1-page summary with the authors name and related information, a description of overall theme plus 2 paragraphs describing a topic discuss during the talk and its relation to topics covered in class.

While every attempt will be made to promptly and accurate grade your work, errors can occur. Any changes in grades or request for re-grading will only be done within one week from the time the assignment is returned. The request for changes needs to be through email.
Note that being too harsh or not having deducted points from a classmate with the same error are not a valid reason for changing a grade!

PROFESSIONALISM

This class is part of professional development. Your conduct should help facilitate order in the classroom, courtesy, respect, and enhance the overall learning experience. Any document that contains profanity (word, acronyms, figures, etc.) will receive an automatic score of zero.

Please turn off cell phones before lecture begins.

KNOWLEDGE REQUIRED TO PASS THIS COURSE

By the end of semester, students will be able to define sustainability and use quantitative analysis to evaluate the impact of civil engineering processes, predict criticality/exhaustion of a resource (e.g., crude oil), identify different phases in the life of a structure or product, perform simple life-cycle assessment to estimate the total energy- and carbon-footprint of a civil engineering system, calculate material indices and select the best materials (with optimum mechanical, durability, and eco-performance) for a project, design efficient cross sections for structural members, calculate the effective properties of composite materials, and explain various techniques for designing green concrete materials. The course is developed to emphasize active learning through interactive classroom discussions, computer simulations, and laboratory exercises. Be aware that not all topics are meant to provide absolute answers but rather a possible solution to a complex problem.

This class has been approved as a primary technical elective in the materials area. Some changes regarding assignments, reading, course content, etc. might occur throughout the semester based on different assessments. Any feedback on your part, both positive and negative, that might help improve the course is welcome.

COMPUTER USAGE

This course will use CANVAS. Class notes, homework, and other assignments will be posted on this site. The grades will be posted there as well. Students must check their account regularly. Students will be responsible of all the information posted on CANVAS.

Students will also be required to use spreadsheets, word processor, and other data processing programs.

ABET REQUIREMENTS

This course is designed to meet the criteria established by the Accreditation Board of Engineering and Technology (ABET). You might be asked to assist in assessing some of these criteria.

UNIVERSITY POLICIES

Safety Statement
The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit https://safeu.utah.edu/
**ADA Statement**

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to arrange for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

**Sexual Misconduct**

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information.

If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677 (COPS).

**STUDENT'S CODE OF CONDUCT**

(http://www.admin.utah.edu/ppmanual/8/8-10.html)

Section 1.B.2: General Provisions and Definitions

“Academic misconduct” includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information, as defined further below. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct.

a. “Cheating” involves the unauthorized possession or use of information, materials, notes, study aids, or other devices in any academic exercise, or the unauthorized communication with another person during such an exercise. Common examples of cheating include, but are not limited to, copying from another student's examination, submitting work for an in-class exam that has been prepared in advance, violating rules governing the administration of exams, having another person take an exam, altering one's work after the work has been returned and before resubmitting it, or violating any rules relating to academic conduct of a course or program.

b. Misrepresenting one's work includes, but is not limited to, representing material prepared by another as one's own work, or submitting the same work in more than one course without prior permission of both faculty members.

c. “Plagiarism” means the intentional unacknowledged use or incorporation of any other person's work in, or as a basis for, one's own work offered for academic consideration or credit or for public presentation. Plagiarism includes, but is not limited to, representing as one's own, without attribution, any other individual's words, phrasing, ideas, sequence of ideas, information or any other mode or content of expression.
d. “Fabrication” or “falsification” includes reporting experiments or measurements or statistical analyses never performed; manipulating or altering data or other manifestations of research to achieve a desired result; falsifying or misrepresenting background information, credentials or other academically relevant information; or selective reporting, including the deliberate suppression of conflicting or unwanted data. It does not include honest error or honest differences in interpretations or judgments of data and/or results.

Underlines added by the instructor.

**DISCLAIMER**

Some of the writings, lectures, films, or presentations in this course may include material that conflicts with the core beliefs of some students. Please review the syllabus carefully to see if the course is one that you are committed to taking. If you have a concern, please discuss it with the instructor at your earliest convenience.
Civil Engineering Code of Ethics

Fundamental Principles

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the enhancement of human welfare and the environment;
2. being honest and impartial and serving with fidelity the public, their employers and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines.

Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.
2. Engineers shall perform services only in areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.
7. Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.
8. Engineers shall, in all matters related to their profession, treat all persons fairly and encourage equitable participation without regard to gender or gender identity, race, national origin, ethnicity, religion, age, sexual orientation, disability, political affiliation, or family, marital, or economic status.

Source: American Society of Civil Engineers (ASCE)

https://www.asce.org/code-of-ethics/