C/EVEN 5/4434 - ENVIRONMENTAL ENGINEERING DESIGN
Spring 2019

	Instructor	Instructor
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GOALS

The primary goal of this course is to help your transition from an engineering student to a practicing engineer. This course provides an authentic engineering experience. The projects are all real, current projects that environmental engineers would be asked to execute. To complete the project scope, you will need to use all the skills learned in your time at CU. You will also need to acquire new information and skills not learned in any class, but that are required for successful completion of the project.

You will gain experience with tackling open-ended design problems and further develop your engineering skills. This experience is more about the process than the outcome, but the outcome is important.

There are three major course outcomes:

1) Work as a team to solve an authentic engineering problem using all your skills
2) "Design an environmental engineering system that includes considerations of risk, uncertainty, sustainability, life-cycle principles, and environmental impacts" (ABET EAC Environmental Engineering Program Criteria)
3) Communicate your design in written reports, drawings, and oral presentations

PREREQUISITE: CVEN 3414 & Senior standing OR instructor consent

SUPPORT: Check D2L site, and your @colorado.edu email daily

COURSE GRADE

Assignment	Weight (%)
Written Proposal	12
Oral Presentation of Proposal	5
Alternatives Assessment (AA) Report	25
Mini-Presentation of Alternatives Assessment	5
Final report: Revised Alternatives Assessment & Preliminary Design Report (PDR)	30
Oral Presentation of Alternatives Assessment and Preliminary Design	15
Other elements: team contract (50 pts), time sheets (10 pts each x 15), CATME participation (4x20 pts), presentation reflections (10 pts each x 3), leadership reflection (100 pts); participation in class including questions during team presentations, etc.	8

Each project is unique. So the specific rubric associated with the project deliverables may be customized to some extent. This will be discussed with the instructor mentoring your project.

At the conclusion of each project phase you will evaluate each team member. We will use **CATME** software to compile the evaluations of each team member individually on five dimensions: contribution to work product, interactions with teammates, keeping the team on track, expecting quality, and having knowledge/skills. Additional questions will diagnose team dynamics problems so that we can do a mid-course correction, if necessary. **A student's individual grade on a team deliverable (e.g. AA report) may be modified as a result of peer assessment**. You will not be given a grade for the written submission until you have completed the evaluation and team dynamics surveys.

5434 Students only: The graduate students in the class will perform an independent review of another project as an individual. After reviewing the assigned project, you will also then critique your own group's report and offer suggestions on how to improve the final PDR.

A NOTE ON PLAGIARISM

You will likely be asked to write more in this class than any other class you have taken. Do not be tempted to take shortcuts. Rigorously cite all references using in-text citations, and keep direct quotations to a minimum. We use a plagiarism checker on all your deliverables. Students in past semesters have paid the price. Reports may be submitted before the deadline for a plagiarism check. Use the "Draft Submittals for Plagiarism Check" area of the Dropbox on D2L.

COURSE SCHEDULE

Wk	Date	Class Period	Assignment Due
1	1/15 1/17	Course introduction, project introductions Proposals and consulting (AB)	Teaming Questionnaire
2	1/22 1/24	Teamwork (MW), Leadership (AB) Design Ethics, QA/QC (AB)	Timesheet; **Team contract**
3	1/29 1/31	Resumes (AB) Effective Presentations (MW)	Timesheet **CATME practice**
4	2/5 2/7	**Proposal Presentations**	Timesheet **Proposal (Friday, 2/8, 3:00 p.m.)**
5	2/12 2/14	**Proposal Presentations**	Timesheet **CATME; presentation evaluations**
6	2/19 2/21	Cost and Decision Analysis (MW) Sustainability Evaluation (AB/MW)	Timesheet
7	2/26 2/28	Leadership (Guest: R. Komarek) Engineering Economics: FE Review (MW)	Timesheet
8	3/5 3/7	Professional Licensure (AB)	Timesheet
9	3/12 3/14		Timesheet
10	3/19 3/21	**Alternatives Assessment Presentations** **Alternatives Assessment Presentations**	Timesheet **Alternatives Assessment Report (Friday, 3/22, 3:00 p.m.); CATME**
Spring Break			
11	4/2 4/4		Timesheet **Presentation Evaluations**
12	4/9 4/11		Timesheet
13	4/16 4/18		Timesheet
14	4/23 4/25	**AA + PDR Presentations**	Timesheet **Leadership Reflective Essay**
15	4/30 5/2	**AA + PDR Presentations** **AA + PDR Presentations**	Timesheet **Final Report & CATME (Sun, 5/5, 7 p.m.)**

Notes:

1. Days with no lecture will be used for team meetings with the instructors and TA.
2. Competitions have different timing requirements, be aware of those dates specific to each project.

DESCRIPTION OF COURSEWORK

There are three distinct phases throughout the semester, and both written submissions and oral presentations are required with each:

1. Proposal and Scope - in response to the request for proposals (RFP)
2. Alternatives Assessment and Recommendation
3. Preliminary Design Report, including revised alternatives assessment

Given the general project description and RFP, your team will prepare a proposal, develop a scope that describes how your team will execute the project, and make an oral presentation to illustrate your qualifications and design approach.

Next, assume that your company was awarded the contract and you will prepare an evaluation of alternatives based on criteria appropriate to your project. Essentially, you must assess project economics, sustainability, and other non-cost factors with a weighted criteria decision matrix. A mini oral presentation will also accompany this evaluation.

Finally, your group will revise the alternatives report in response to feedback, develop the selected alternative into a more detailed preliminary design, and complete a detailed cost estimate. This will be presented in both an oral and written form. Note that the competition projects have additional specific requirements and deadlines.

Oral Presentations

For each oral presentation everyone in the group must present (for competitions with a presentation, it may be good tactics to only have your best 2-4 presenters present). Both an individual presentation score and a group grade will be given. Depending on your clients, an additional presentation may be required at the client site.

Presentations will be recorded. After the presentations each person is required to reflect on the presentation by writing a list of three positive and three negative aspects of the *team* presentation, and three positive and negative aspects of your *individual* presentation. Discuss ways that you wish to improve the next presentation. Submit this written reflection to the dropbox in D2L.

Class Periods

There will be periodic lectures on the design process. These should be interactive discussions. On-time attendance is required for all class days. This is particularly important on days when teams are giving their oral presentations. Lack of attendance may be deducted from the "other" part of your grade. Notify the TA if you will be missing class.

Team Meetings

Every week each group will have a meeting with one of the faculty mentors. These will typically be scheduled during class time. The project manager will submit an agenda 24 hours in advance of the meeting. The agenda will typically include a brief update of progress, specific challenges and successes, and the path forward. The remaining time will be used to answer specific questions that you have, and for the project principal to ask you questions or make suggestions to help your group.

Every other week the team will meet with the Teaching Assistant. Discuss issues with project progress and seek advice on finding resources, etc.

Rules for effective meetings

- Be on time
- Have an agenda

Timesheets

Each team will set up their timesheets as a Google doc that will be shared with all members of the team, the TA, and the course instructors. Each person will log their hours worked and tasks completed on these timesheets. Be sure your timesheet is completed prior to midnight Monday. The TA will review these timesheets for completeness on Tuesday. There are two purposes of these timesheets: (1) to simulate a real consulting firm where you must account for the number of hours you spend on various projects for the purpose of billing the clients; and (2) to help track individual effort toward the team project. The Time Sheet should cover the previous week Monday through Sunday period. Lying on your time sheet is the fastest way to get fired in the "real world," in this class it will be treated as an Honor Code violation (the same as cheating on a test).

Handling Negative Team Dynamics

At times, some team members may not do their fair share of work or may be disruptive to the team. This can also happen in the professional world. In this class, notify your faculty mentor as soon as there is a conflict, and we will work together to resolve the issue. Only the instructor has the authority to terminate a student from a team.

MAP TO ABET PROGRAM OUTCOMES	Emphasis
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Large
3. an ability to communicate effectively with a range of audiences	Large
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Medium
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Large
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	None
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

CU BOULDER POLICIES

Accommodation for Disabilities
If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website.

Classroom Behavior
Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the semester so that we may make appropriate changes to our records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Honor Code
All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: **plagiarism**, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation
The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website. Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Holidays
Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, **contact the instructor to discuss accommodations.** See the campus policy regarding religious observances for full details.