

CE 4803B – Sustainable Problem Solving Lab

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TIME: Summer Quarter 1996
Lectures: To be announced

PLACE: Mason Civil Engineering Building; Room 312

CREDITS: 3 Credits (2 Design Hours)

ABSTRACT

This course provides an introduction to systematic problem solving and decision making using the principles of sustainability and sustainable design as guiding objectives. An introduction to sustainability with respect to problem solving will be presented, and a general framework for problem solving will be taught and demonstrated through projects both in and out of class. Tools, methods, and techniques for gathering information, generating, analyzing and evaluating alternatives, and developing implementation strategies will be presented and demonstrated. The course is intended to introduce students to the tools and mindset required for solving engineering problems sustainably, and to demonstrate sustainable problem solving for a real world problem. This course is part of a series of courses in sustainability sponsored by the GE Fund and the National Science Foundation.

TEXT AND REQUIRED READINGS

There is no required textbook for this course. Required readings and articles for the course will be distributed to students in class. A bibliography of these readings is listed in

Attachment A. A list of suggested readings for students interested in expanding their knowledge of topics covered in this course is provided in Attachment B.

Additional reading material for the course will be made available as needed. A selected set of references on sustainability and sustainable design is available for short-term checkouts at the Center for Sustainable Technology administrative office in room 322 of the Mason building.

EDUCATIONAL OBJECTIVES

The principal educational objectives of the course are to:

- 1) familiarize students with the concept of sustainability, and its ramifications for design, decision making, problem solving, and engineering.
- 2) introduce students to a general approach for solving problems, and show how it can be applied to real world problems
- 3) acquaint students with the principal methods, tools and techniques used to solve design problems and synthesize solutions, and to acquire and process information.
- 4) develop specific skills for interfacing with the public, and presenting design recommendations.
- 5) develop a set of feasible solutions for a real world problem.
- 6) strengthen written and oral communication and presentation skills.
- 7) strengthen problem-solving skills, working both individually or in groups.

COURSE DESCRIPTION

The course includes a combination of lectures, assigned readings, class discussions, and one independent project and presentation.

Who should take this class?

All students who are interested in **applying principles of sustainability** to engineering design may take this class; the course is not limited to students with an engineering background. This course is another in the series of the undergraduate curriculum for sustainable engineering offered by the School of Civil and Environmental Engineering. There are no prerequisites for this course; however, prospective students are encouraged to take the other courses in the series to become more familiar with the principles of sustainability. Due to the self-designed nature of the independent project, this course is appropriate for both graduate and undergraduate students.

Lectures and Assigned Readings

The detailed list of lecture/discussion topics and assigned readings is contained in the Course Schedule (Attachment A). The lectures provide the conceptual framework for the course and supplement (i.e., not replace) the assigned readings. It will be to the students' advantage to complete the readings before the lecture date so that questions which may arise can be discussed more fully. Students are expected to have a working understanding of the lecture and reading materials, whether they are present in class or not.

Class Participation

Active class participation is expected and required since the course will include

course include, but are not limited to: 1) contributing in an active way to class discussion of concepts and ideas; 2) presenting a brief summary and/or personal interpretation of reading materials upon the instructor's request; and 3) presenting issues from out-of-class projects for general discussion related to the topic at hand.

Class Usenet Newsgroup

A Usenet newsgroup has been set up for the purposes of this class. The newsgroup name is **git.ce.construction.sustainability_lab**. A brief introduction to Usenet will be given on the first day of class, but students are expected to become familiar with Usenet on their own. Students should be able to access Usenet via their student accounts, read postings to the class newsgroup, and post messages to the group. Guidelines for posting messages can be found in the newsgroup net.user.newusers, and instructions for using various popular newsreaders can be obtained from OIT as well as on-line. All students are encouraged to read the newsgroup regularly, and use it as a communication forum for discussion of lectures, learning essays, and project information. Any questions about the class or its content should be posted to the newsgroup, and may be answered by either the instructors or other students in the class. Additional communication between students and the instructors is encouraged to take place via email.

Learning Essay

Students are required to submit a final learning essay at the end of the quarter. The purpose of this learning essays is to encourage you to: 1) absorb the information disseminated in class; 2) reflect on this information and consider how it may be applied to the your philosophies and practices with respect to sustainability; and 3) articulate the outcome of these reflections in written form. Content of the learning essay should include:

- 1) a summary of the important points you learned in the course.
- 2) personal reflections on what was learned and how this has influenced your thinking since the start of the quarter.
- 3) articulation of the most and least helpful aspects of the course in achieving your objectives.

The final learning essay should summarize what you have learned in the course, and how you will apply what was learned. This final learning essay will account for ten (10) percent of the final course grade.

Class Projects

There will be **one (1) project** to be completed over the course of the quarter. The purpose of this project is to provide students with an opportunity to apply the principles of sustainability and sustainable design to a real world problem of their own choosing. The project will also provide a chance for students to strengthen their general thinking, organizational, and written and oral communication skills. Because topics for the projects will be taken from the real world, students will gain valuable experience in dealing with the kinds of people and problems with which they will have to work upon entering professional practice.

Additional information about the nature and scope of the project will be provided over

evenly distributed over the last five weeks of the quarters. The project will comprise seventy (70) percent of the final grade for the course. Students are encouraged to work in groups whenever appropriate for portions of their projects, since problems in the real world are almost always undertaken by teams rather than individually. The final report is required to be an individual effort. All team efforts which make up a part of individual projects must be appropriately documented as discussed in class.

Assignments

There will be seven individual and/or group assignments required throughout the quarter, some of which will serve as drafts for sections of the final project. Prompt review of each submission will be provided by the instructors. These comments should be useful to the students in preparation of the final project report. The quality and prompt submission of these assignments will serve as grading criteria. Together, the seven assignments will comprise 20% of the total grade for the course.

FEEDBACK AND GRADING

The breakdown of the total grade is:

• Final Learning Essay	10 %
• Out-of-class Project Draft	5 %
• Out-of-class Project	65 %
• Assignments	<u>20 %</u>
Total:	100 %

The instructors will make every attempt to provide prompt feedback on all student submissions, either written or electronically. In addition, the instructors will specify open office hours for student questions and consultations. If appropriate, the instructors will institute an open door policy for student consultations. However, the primary forum for discussions, questions, and answers should be the class newsgroup on Usenet.

NOTES:

The course description and course schedule handouts provide the general framework for the course. However, the instructors reserve the right to make any modifications or changes to the course, depending on the class progress, or on any special circumstance that may arise during the quarter.