

CVEN 689
“SUSTAINABLE SYSTEMS IN CIVIL ENGINEERING”
SUMMER SESSION II 2006

DEPARTMENT OF CIVIL ENGINEERING, TEXAS A&M UNIVERSITY

Instructor

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Lectures: MTWRF 8:00-9:35 AM, Room CE 203

Format: Course credit hours: 3; Lecture hours per week: 3; Lab hours per week: 0

Prerequisites: None

Text: Readings are specified in the calendar below and will be accessed online through the course website(marked with {w}), or directly at a given URL, or through the TAMU Library electronic collections (marked with {e}). Since class meetings will be mostly spent in discussion on readings, the reading assignments must be read before class. Additional readings may be specified during the semester.

Course Description

Definitions of sustainability and sustainable development from social, economic, political, and technical perspectives; concepts of natural capital, resource fungibility, strong and weak sustainability; industrial ecology; life-cycle analysis; valuation of environmental goods and externalities; sustainable infrastructure design and management.

<u>Grading:</u>	Midterm Exam 1	25%
	Midterm Exam 2	25%
	Review Paper	25%
	Term Project	25%

The Midterm Exams will be traditional in-class, individual exams covering sustainability theory. The exact format of the exam (e.g., open versus closed book, etc.) will be specified prior to the exam date.

The Review Paper will require students to read technical literature beyond the assigned course materials, critically analyze the materials, and synthesize an understanding of the role of sustainable development in civil engineering systems (or another field as approved by the instructor) beyond that already covered in class.

The Term Project will involve teams of students performing quantitative analysis of a civil engineering problem (or a problem in another field approved by the instructors) using the tools of sustainability learned in the course. The goal of this project is to demonstrate the possibility for improved engineering practice vis-à-vis current issues utilizing sustainability methods.

Course Website: It's a good idea to check the course website at least daily for announcements. The website will also be the means by which handouts, some readings, assignments, etc., will be distributed.

http://ceprofs.tamu.edu/kbrumbelow/CVEN689/CVEN689_SSCE_Brumbelow.htm

Course Outline: Below is the tentative outline for the course this semester. Modifications to this schedule may be announced in class or on the course website at any time. Please note the reading assignments and complete them *before* the relevant class period.

Date	Topic and Reading Assignments
7/5	Course Introduction
7/6	The commons and externalities: <i>Hardin, G., The tragedy of the commons, Science, 162(3859), 1243-1248, 1968. {e}</i>
7/7	Natural capital and ecological economics: <i>Daly, H.E., From empty-world economics to full-world economics..., 1992. {w} and Costanza, R., The ecological economics of sustainability, ... 1992. {w}</i>
7/10	Applying natural capital to the case of stormwater engineering: <i>McCuen, R.H. 2003. Smart growth: Hydrologic perspective. J. Prof. Issues Eng. Educ. Pract., 129(3), 151-154. {e}</i>
7/11	<u>Exercise:</u> Natural capital and stormwater engineering
7/12	Fungibility and Strong vs. Weak Sustainability: <i>Solow, R., Sustainability: An economist's perspective, ... 1991. {w}</i>
7/13	Entropy and Thermodynamic concepts in SD: <i>Georgescu-Roegen, N., The entropy law and the economic problem, ... 1971. {w}</i>
7/14	<u>Exercise:</u> Fungibility, entropy, and desalination as a water resource
7/17	Ethics of sustainable development: <i>Engel, J.R., The ethics of sustainable development, ... 1991. {w}</i>
7/18	Ethics (continued): <i>Lubchenco, J., Entering the century of the environment: A new social contract for science, Science, 279(5350), 491-497, 1991. {e} and American Society of Civil Engineers, Code of Ethics. www.asce.org {e} and Leopold, A., A Sand County Almanac (excerpt), {w}</i>
7/19	The key to SD: Technology or Policy? <i>Huesemann, M.H., The limits of technological solutions to sustainable development, Clean Technologies and Environmental Policy, 5(1), 21-34, 2003. {e} and Cywinski, Z., Current philosophy of sustainability in civil engineering, J. Prof. Issues Eng. Educ. Pract., 127(1), 12-16, 2001. {e}</i>
7/20	<u>Exercise:</u> Ethics, SD, and construction of infrastructure for refugee camps
7/21	Midterm Exam #1

7/24	<p>Metrics of SD: <i>Tanzil, D., G. Ma, and B.R. Beloff, Sustainability metrics, 2003, www.bridgestos.org/GINmetrics.pdf {e} and Baetz, B.W., and R.M. Korol, Evaluating technical alternatives on basis of sustainability, J. Prof. Issues Eng. Educ. Pract., 121(2), 102-107, 1995. {e}</i></p>
7/25	<p>Metrics of SD (continued): <i>Venetoulis, J., D. Chazan, and C. Gaudet, Ecological Footprint of Nations 2004, Redefining Progress, Sustainability Indicators Program, 2004. www.redefiningprogress.org/publications/footprintnations2004.pdf and Loucks, D.P., Sustainability implications for water resources planning and management, Natur. Resour. Forum, 18(4), 263-274, 1994. {w}</i></p>
7/26	<p>Life-cycle analysis/SD in Environmental Engineering <i>Solano, E., et al., Life-cycle-based solid waste management. I: Model development and II: Illustrative applications, J. Envir. Eng., 128(10), 981-992 and 993-1005, 2002. {e}</i></p>
7/27	<p>SD in Transportation Engineering <i>Jeon, C.M., and A. Amekudzi, Addressing sustainability in transportation systems: Definitions, indicators, and metrics, J. Infrastr. Sys., 11(1), 31-50, 2005. {e} and Kitou, E., and A. Horvath, Transportation choice and air pollution effects of telework, J. Infrastr. Sys., 12(2), 121-134, 2006. {e}</i></p>
7/28	<p>SD in Construction, Materials, and Structural Engineering <i>Hendrickson, C., and A. Horvath, Resource use and environmental emissions of U.S. construction sectors, J. Construc. Eng. Mgmt., 126(1), 38-44, 2000. {e} and Keoleian, G.A., et al., Life cycle modeling of concrete bridge design: Comparison of engineered cementitious composite link slabs and conventional steel expansion joints, J. Infrastr. Sys., 11(1), 51-60, 2005. {e}</i></p>
7/31	<p>SD in Construction, Materials, and Structural Engineering (cont.) <i>Review web site of the U.S. Green Building Council (www.usgbc.org). Pay particular attention to pages concerning "LEED: Leadership in Energy and Environmental Design." <u>Skim</u> the following documents: LEED-NC (https://www.usgbc.org/ShowFile.aspx?DocumentID=1095), LEED-EB (http://www.usgbc.org/ShowFile.aspx?DocumentID=913).</i></p>
8/1	<p>SD in Geotechnical, Dredging, and Water Resources Engineering <i><u>Skim</u> Palmieri, A., et al., Reservoir Conservation: The RESCON Approach, Vols. I and II, available at www.enghydro.com/publications/selected%20publications/Vol1.pdf and www.enghydro.com/publications/selected%20publications/Vol2.pdf, respectively.</i></p>
8/2	<p>Midterm Exam #2</p>
8/3	<p>SD in Water Resources Engineering <i>Thornton, J., Water Loss Control Manual, McGraw-Hill, New York, 2002. (excerpts) {w}</i></p>
8/4	<p>SD in Environmental and Water Resources Engineering <i>Goldstein, J., and A. Huber-Lee, Global lesions for watershed management, Water Environment Research Foundation, 2004. {w}</i></p>

8/7 Course closure and assessment

8/9 **Presentation of 689 Term Projects/489 Review Papers, 8:00-10:00 AM**

Official Notices

ADA Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637.

Academic Integrity Statement: “An Aggie does not lie, cheat, or steal or tolerate those who do.” Students are expected to understand and abide by the Aggie Honor Code presented on the web at: <http://www.tamu.edu/aggiehonor>. No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but are not limited to syllabi, notes, quizzes, exams, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts unless I expressly grant permission.

Cheating on quizzes and exams will not be tolerated. Cheating will be reported and handled in accordance with the Aggie Honor System Process. Some or all examinations will be closed book; “looking at another student’s examination or using external aids (for example, books, notes, calculators, conversation with others, or electronic devices)” during these examinations is a violation of Texas A&M Aggie Honor Code, Cheating, unless specifically allowed in advance by the instructor.

Unless specifically allowed in advance by the instructor, all assignments and homework in this class are expected to be completed based on individual effort. Copying the work of others, including homework, is a violation of Texas A&M Aggie Honor Code, Cheating.