

# CE 371 SYLLABUS

## Sustainable Civil and Environmental Engineering Systems Fall 2018

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Time & Location: MWF 8:00 - 8:50 AM  
2243 Engineering Building

Office hours: Wednesday 9-10:30AM EB3575 or by appointment

### **COURSE WEBSITE & STRUCTURE**

CE 371 utilizes the University's Desire2Learn (D2L) for course communication, which can be accessed at: <https://D2L.msu.edu>.

### **COURSE DESCRIPTION**

The class introduces sustainability concepts and sustainable engineering design process to prepare a new generation of civil & environmental engineers to address complex societal problems. The application of system approach is presented with real world applications in the area of civil & environmental systems planning. The class introduces various tools such as life cycle assessment; design for X (DfX), industrial ecology and multi-criteria decision analysis. A project is used to evaluate students' ability to use these tools and recommend a sustainable solution to a given problem.

### **COURSE LEARNING OBJECTIVES**

The learning objectives for this course are varied, ranging from the very general to the specific. Proficiency is demonstrated through laboratory work, class assignments, projects, and exams.

1. Describe basic principles of sustainability as they relate to civil/environmental engineering design (e.g., green design, LEED certification)
2. Explain social, ecological, and economic aspects of sustainable engineering decision-making
3. Perform simple mass and energy balances in context of responsible design and design-for-end-of-life decision making
4. Apply basic principles of sustainability to development projects related to civil and environmental engineering
5. Propose design for X alternative of a product where X is a specific goal such as cost, environment, recyclability, energy consumption, etc.
6. Analyze the design for X alternative in terms of sustainability principles
7. Explain the "time value of money" and how it affects the analysis of alternatives
8. Calculate the present, annual, and future worth of cash flow elements/streams
9. Perform a simple net present worth analysis in the context of comparing alternatives
10. Perform benefit-cost analysis and life cycle assessment

## REQUIRED TEXTS

There are no required texts for this course. There will be extensive course material on PowerPoint slides and other supplementary materials (which will be made available to students through course web access i.e., D2L). Students will also be required to find materials on the Internet.

The following texts may be referenced during the course:

- 1) Graedel, Thomas E., and Braden R. Allenby. *Industrial ecology and sustainable engineering*. Prentice Hall, 2010.
- 2) Striebig, Bradley, Adebayo A. Ogundipe, and Maria Papadakis. *Engineering applications in sustainable design and development*. Nelson Education, 2015.

## COURSE REQUIREMENTS AND GRADING

### Grading

▪ Homework	30%
▪ Project	20%
▪ Midterm	20%
▪ Final	30%

### Grading Scale

≥90% = 4.0; ≥85 and <90% = 3.5; ≥80 and <85% = 3.0; ≥75 and <80% = 2.5; ≥70 and <75% = 2.0; ≥65 and <70% = 1.5; ≥60 and <65% = 1.0; and <60% = 0.0.

### Assignments

- Given on most Wednesdays and due electronically a week later.
  - Problem solving, reading assignments, written critiques of readings, etc.
- Late homework: automatic 20% deduction for every day overdue (8:01 AM is considered 1 day late)
- The lowest homework grade will be dropped.

### Portfolio & Back-up Files

It is the student's responsibility to keep back-up copies of all course work. Students may want records of each step of the process for his/her portfolio or reference at a later date.

### Communication & Schedule Changes

Instruction changes, schedule changes, comments, and grading information will be announced on D2L and/or via email. The most up to date course schedule will always be posted on D2L. Faculty reserves the right to make changes in the course schedule and syllabus as necessary to facilitate learning.

### Grade Penalties and Changes

1. Late penalties for late assignments
2. Penalty for cheating is failure of the course;
3. Penalty for missing an exam without prior approval of excuse — 0.0 on the exam unless there are mitigating (serious and documented) circumstances; and
4. Allowances and/or adjustments may be made for improvement or degradation of performance over the course of the term.

## Academic Honesty

Article 2.3.3 of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the Department of Civil and Environmental Engineering adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. (See [Spartan Life: Student Handbook and Resource Guide](#) and/or the MSU Web site: [www.msu.edu](http://www.msu.edu).)

Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. Also, you are not authorized to use the [www.allmsu.com](http://www.allmsu.com) Web site to complete any course work in this course. Students who violate MSU academic integrity rules may receive a penalty grade, including a failing grade on the assignment or in the course. Contact your instructor if you are unsure about the appropriateness of your course work. (See also the [Academic Integrity](#) webpage.)

## Inform Your Instructor of Any Accommodations Needed

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. If you have a documented disability and verification from the Resource Center for Persons with Disabilities (RCPD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to RCPD and meet with an RCPD specialist to request special accommodation *before* classes start.

Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("VISA") form. Please present this form to the instructor at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date may not be honored.

RCPD is located in 120 Bessey Hall, near the center of the Michigan State University campus, on the southwest corner of Farm Lane and Auditorium Road. RCPD may be contacted by phone at (517) 884-7273 (884-RCPD), or via their website [www.rcpd.msu.edu](http://www.rcpd.msu.edu).

## Observing a Major Religious Holiday

A student may make up course work missed to observe a major religious holiday only if arrangements are made in advance with the instructor.

## Participation in a Required Activity

To make up course work missed to participate in a required activity for another course or a university-sanctioned event, a student must provide the instructor with adequate advanced notice and a written authorization from the faculty member of the other course or from a university administrator.

## Attendance

Students whose names do not appear on the official class list for this course may not attend this class.

## Disruptive Behavior

Article [2.3.5](#) of the Academic Freedom Report (AFR) for students at Michigan State University states that "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article [2.3.10](#) of the AFR states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." [General Student Regulation 5.02](#) states that "no student shall

interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Faculty Judiciary process.

### The Fundamentals of Engineering Exam

The Fundamentals of Engineering Exam (FE) is a 6-hour, 110-question computerized multiple choice exam that is typically taken by engineering students during the final year of undergraduate study. Passing the FE is a required step towards becoming a licensed professional engineer and will also make for a more attractive resume when searching for a job.

Students may choose from one of seven discipline-specific tests, including FE-Civil and FE-Environmental. The exam can be taken at any Pearson Vue testing center (<http://ncees.org/exams/test-center-locations/>), with the nearest center located at 3390 Pine Tree Road in Lansing. There are also testing centers in Ann Arbor, Grand Rapids, and Detroit. Additional information about the FE may be found at: <http://ncees.org/engineering/fe/>.

### COURSE SCHEDULE (Subject to change):

Date	Topic
August 29 - 31	Introduction to Sustainability
Sept 5 - 7	Industrial Ecology / Ecological analogies
Sept 10- 14	Ecological analogies (Metabolism /Food web /Industrial Symbiosis) / Material Flows
Sept 17-21	Resource use and scarcity
Sept 24-28	Greenhouse gases & energy
Oct 1-5	Water / Food / Built environment (LEED)
Oct 8	Midterm
Oct 10 -12	Intro to LCA
Oct 15-19	LCA part II – Design for X
Oct 22-26	Pollution Prevention / Social LCA
Oct 28- Nov 2	Open LCA – Introduction to project
Nov 5-9	Economics - Time value of money
Nov 12- 16	Life cycle cost analysis and economic analyses
Nov 19-21	Systems Analysis and Multi-criteria decision analysis
Nov 26-30	Wicked problems / Social dimension of sustainability
Dec 3-5	Final Presentations (No class but project due on Dec 7)
<b>December 10</b>	Final exam 7:45 AM