

ERE 133: INTRODUCTION TO ENGINEERING DESIGN

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<i>Class Meetings</i>	Monday/Wednesday 10:35–11:30 A.M. Thursday 12:30–3:20 P.M.	321 Bray 432/309 Baker
<i>Office Hours</i>	To be announced	

Required Textbooks Available from Syracuse University Bookstore
Engineering Design, 3rd Edition, C.L. Dym and P. Little
Engineering Graphics Essentials with AutoCAD 2012 Instruction, K. Plantenberg
Writing with Style: Conversations on the Art of Writing, 3rd Edition, J.R. Trimble

Required Materials
Engineers scale, mechanical pencil and eraser

Course Objectives

ERE 133 introduces the engineering profession, including design, communication, ethical and professional behavior, teamwork, and data analysis. This course reinforces learning through study, conduct and critique of design exercises related to environmental resources engineering. Students will engage in individual and team-oriented activities such as lecture, discussion, observation, computation, reading and writing.

Outcomes

At the completion of this course, each student will be able to:

1. Use an engineering design approach to design a product, process or system that meets desired needs within given constraints and performance criteria.
2. Communicate effectively using oral, written and graphic processes consistent with the needs and tools of the profession, including word processing, spreadsheet analysis, oral presentations, and engineering graphics.
3. Function as part of a team of peers to solve an engineering problem.
4. Describe the professional and ethical responsibilities of an engineer.
5. Explain the need for lifelong learning and describe sources for learning outside the classroom.

Course Description

Students in ERE 133 will utilize a range of tools to design solutions to open-ended, engineering problems. The design will require problem analysis and evaluation of practical alternative solutions in order to specify a chosen alternative. Students will follow a design process, which involves inquiry, deliberation, evaluation, innovation and attention to professional duty. Major concepts planned for the semester include:

1. Develop an understanding of engineering analysis and design processes.

2. Expand written, graphic and oral communication skills, including memoranda, reports, plans and specifications, oral and poster presentations, and orthographic and isometric drawings.
3. Increase proficiency in the use of engineering tools, such as software designed for word processing (e.g., MS Word), spreadsheet analysis (MS Excel), presentations (MS PowerPoint), and graphics (AutoCAD).
4. Develop an appreciation of the functional roles, assessment and feedback necessary for successful teamwork.
5. Investigate the engineering profession and its role in contemporary society.
6. Explore issues in professional development, licensing and engineering ethics.

Students will receive guidance in the systematic application of engineering design and project management skills to solve environmental resource-related problems. Student participation in classes and as part of a team is essential to the success in this course. Students are expected to participate in classes, project development, report writing, and oral presentations.

Evaluation

Evaluation is used to determine your success in meeting minimum standards of quality and performance. Your performance on a team and the quality of your proposed solutions contribute greatly towards your final grade. We will place emphasis on your ability to apply a design process that leads to a quality solution. Team evaluation will consider the systematic application of the design process, including documentation, time management, participation in team and class activities, and the quality of work that leads to a solution. The evaluation also includes work products such as reports, presentations and other documents.

Grade distribution

The table to the right summarizes the major components that will contribute to your grade in ERE 133.

<i>Component</i>	<i>Contribution</i>
Oral presentations (three projects)	30 %
Engineering design reports (three projects)	45 %
Peer evaluation and course participation	15 %
Additional Work Products Memoranda Graphics assignments Mini-design project submissions	10 %

Grade assignment

The numerical scores you earn on the components listed above will average to a final numerical score for the course. Letter grades will be assigned based on the scale shown to the right; the grade cutoffs may be adjusted by a point when actually assigning final grades.

<i>Letter Grade</i>	<i>Range of Numerical Grade</i>
A	90 and above
A-	87 to just less than 90
B+	84 to just less than 87
B	80 to just less than 84
B-	77 to just less than 80
C+	74 to just less than 77
C	70 to just less than 74
C-	67 to just less than 70
D	60 to just less than 67
F	less than 60

Principal Work Products

Oral Presentations

Three oral presentations are required during the semester: one associated with each of the three design projects completed. Each group will make oral presentations before an audience of peers, faculty and professional colleagues. Evaluation criteria will consider the delivery, quality and content of the presentations.

Engineering Design Reports

Each student will submit an Engineering Design Report for each of the three design projects completed. The instructors will evaluate the written reports for conformance with the guidelines and specifications provided in class. The reports should demonstrate the quality of the design process followed and the robustness of the proposed solution. Documentation of the design process, calculations and graphics will form a significant portion of the evaluation.

Peer Evaluation and Participation

Each team member will provide an evaluation of their teammates' contributions at several points in the semester. Evaluation guidelines will be provided in class.

Student progress and participation will be evaluated regularly throughout the semester. Key tools for assessment include assessment of student performance during structured class activities and peer assessments. Assessments will be real-time (occurring during the execution of an activity), formative, or summative (occurring at the conclusion of an activity). Self-assessment (individual student responsibility for self-assessing performance) will be integral to successful completion of the course. The instructors' evaluation of these assessments will consider completeness, participation, and evidence of growth during the semester.

Additional Work Products

Memoranda

Throughout the course of the semester, groups will be required to submit professional memoranda. Grading of the memoranda will consider both content and style. The instructors will provide guidance to ensure that all groups meet a high professional standard.

Graphics assignments

Engineering graphics is an important tool for communication, engineering analysis and design. Students will explore freehand sketching and drawing with the aid of traditional instruments and computer-aided drafting (CAD) software and will submit output from these exercises for assessment. Work will be assessed on neatness, layout, line clarity, angle definition, satisfaction of problem statement, and other criteria specified with each assignment.

Mini design project submissions

There will be several small design projects performed throughout the semester. These projects may require preparation ahead of time and will certainly require interaction in class. These activities may have additional, small submissions.

Academic Integrity

Academic dishonesty is unacceptable evidence of character and will be dealt with severely. Acts that suggest academic dishonesty e.g., plagiarism or cheating, may result in a grade of zero for the work submitted, as well as other possible academic actions.

Sources of Support and Class Absence

If you experience academic or personal difficulties that affect your studies or life, there are many sources of support on campus. The College provides a website that serves to answer many student questions: <http://www.esf.edu/students/success>. In addition, the ESF Office of Student Affairs, 110 Bray Hall (470-6660) will provide academic support, career guidance, personal counseling, or direct you to the proper source of help. If you encounter a situation beyond your control in which you will be missing two or more days of classes, you can contact the Office of Student Affairs and they will contact your instructors. Supportive documentation may be required.

Accommodations for Students with Disabilities

If you have an identified disability and will need accommodations, you should contact the Office of Student Affairs in 110 Bray Hall. Staff in this office will discuss the ESF process and work with you to access supportive services. The College requires you to provide supportive documentation for any learning disability and will then develop an approved accommodation sheet for you. Accommodations cannot be provided until the accommodation sheet is established and we meet to discuss its applicability to this course. Accommodations cannot be established retroactively.

Course History

This course has evolved alongside the Environmental Resources Engineering program. Dr. James Hassett taught the initial offering of the course as FEG 296 in 2008 when it first combined material from the previously required one-credit FEG 300 (design) and ERE 225 (graphics) courses taught by Professor Doug Daley. This course was offered twice as FEG 133 in largely the same format it is in today. We thank the prior instructors for providing materials for use in this class.

ERE 133 LECTURE SCHEDULE FOR 2013

Week	Session	Topics	Readings to be discussed*	Submissions
1	14 Jan	Introduction to engineering and communication	D&L Chapter 8	
	16-Jan	Brainstorming		
2	21-Jan	<i>No Class – Martin Luther King Jr</i>		
	23-Jan	Introduction to engineering design	D&L Chapter 1	
3	28-Jan	Mini design – paper airplanes		Airplane design sheet due
	30 Jan	The design process; Communication	D&L Chapter 2, T Chapter 1	Geospatial project memo due
4	4-Feb	Defining the problem	D&L Chapter 3 & 4	
	6-Feb	Writing – getting going	D&L Chapter 9.3, T Chapter 2	
5	11-Feb	Communication – oral	D&L Chapter 9	
	13-Feb	Mini design project – Lego bridges		
6	18Feb	Design alternatives	D&L Chapter 5	Geospatial project report due
	20-Feb	Team dynamics and project management	D&L Chapter 10	
7	25-Feb	Prototypes – Mini design project – hoists	D&L Chapter 7	
	27-Feb	Writing – openers	T Chapter 3	
8	4-Mar	Writing – middles and closers	T Chapter 4 & 5	Ecological Eng. project memo due
	6-Mar	Writing – diction and readability	T Chapter 6 & 7	
9	11/13-Mar	<i>No Class – Spring Break</i>		
10	18-Mar	Mini design project – spaghetti towers		
	20-Mar	Writing – superstitions and critical analysis	T Chapter 8 & 9	Ecolog. Eng. poster outline due
11	25-Mar	Ecological Engineering project work time		
	27-Mar	Mini design project – catapult		Ecological Eng. project report due
12	1-Apr	Writing – revising and proofreading	T Chapter 10 – 12	
	3-Apr	Water Resources project work time		
13	8-Apr	Writing – other thoughts	T Chapter 13 – 16	Water Resources project memo due
	10-Apr	Mini design project – egg drop design		
14	15-Apr	Mini design project – egg drop testing		Egg drop design sheet due
	17-Apr	Lifelong learning		
15	22-Apr	Future design considerations	D&L Chapter 11	
	24-Apr	Water Resources project work time		
16	29-Apr	Engineering ethics	D&L Chapter 12	Water Resources project report due

*Reading source

D&L: C.L. Dym and P. Little, *Engineering Design*, 3rd Edition
T: J.R. Trimble, *Writing with Style*, 3rd Edition

ERE 133 LAB SCHEDULE FOR 2013

Week	Session	Topics	Assigned Graphics Exercises*
1	17-Jan 12:30 – 3:20	AutoCAD Chapter 1	P1: 1, 2, 3 (due 24 Jan)
2	24-Jan 12:30 – 2:10 2:20 – 3:20	Geospatial project work time AutoCAD Chapter 2	P2: 1, 2, 5, 19, 21, 22, 23 (due 31 Jan)
3	31-Jan 12:30 – 2:10 2:20 – 3:20	Geospatial project work time AutoCAD Chapter 3	
4	7-Feb 12:30 – 2:10 2:20 – 3:20	Geospatial project work time AutoCAD Chapter 3	
5	14-Feb 12:30 – 2:10 2:20 – 3:20	Geospatial project presentations AutoCAD Chapter 4	P3: 1, 2, 3, 4 (due 14 Feb)
6	21-Feb 12:30 – 2:10 2:20 – 3:20	Ecological Engineering project work time AutoCAD Chapter 4	P4: 2, 3 (due 28 Feb)
7	28-Feb 12:30 – 2:10 2:20 – 3:20	Ecological Engineering project work time AutoCAD Chapter 5	
8	7-Mar 12:30 – 2:10 2:20 – 3:20	Ecological Engineering project work time AutoCAD Chapter 5	P5: 4, 5 (due 8 Mar)
9	14-Mar	<i>Spring Break</i>	
10	21-Mar 12:30 – 3:20	Ecological Engineering project work time	
11	28-Mar 12:30 – 3:20	Ecological Engineering project presentations	
12	4-Apr 12:30 – 3:20	Water Resources project work time	
13	11-Apr 12:30 – 3:20	Water Resources project work time	
14	18-Apr 12:30 – 3:20	Water Resources project work time	
15	25-Apr 12:30 – 3:20	Water Resources project presentations	

Footnote:

* Assigned graphics exercises are from the end of chapter materials. Additional in-class exercises will be completed during the lab.