

**FEG 133**  
**INTRODUCTION TO ENGINEERING DESIGN**

***Instructor***

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***Teaching Assistants***

Donnie Rayome and Laura Calandra

***Class Meetings***

Tuesday/Thursday 9:30 – 10:25	432 Baker
Thursday 12:30 – 3:20	432/309 Baker

***Office Hours***

To be announced

***Required Textbooks***

Available from Follett's Orange Bookstore, Marshall Square Mall  
Engineering Design, 3<sup>rd</sup> Edition, C. L. Dym and P. Little  
Engineering Graphics Essentials with AutoCAD 2010 Instruction, K. Plantenberg  
Writing with Style: Conversations on the Art of Writing, J. R. Trimble

***Required Materials***

Engineers Scale  
45-45° and 30-60° drafting triangles  
Mechanical pencils 0.5 mm and 0.7 mm with HB and 2H leads  
Eraser

***Course Objectives***

FEG 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, computation, 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 FEG 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. Investigate the engineering profession and its role in contemporary society;
2. Develop an understanding of engineering analysis and design processes;
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. Expand written, graphic and oral communication skills, including memoranda, reports, plans and specifications, oral presentations, project logbook and orthographic and isometric drawings;
5. Develop an appreciation of the functional roles, assessment and feedback necessary for successful teamwork;
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. Students are expected to record project correspondence in a logical format as part of the documentation process. While much of the assessment and evaluation is in written form, any verbal communications between instructors, consultants and students should be recorded as part of the project documentation.

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, field trips, investigations, guest speaker presentations, report writing, and oral presentations. Students will also maintain project management records and personal journals in addition to the usual class notes.

## ***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***

Oral Presentations Project 1, Project 2, Project 3	30%
Engineering Design Reports Project 1, Project 2, Project 3	45%
Peer Evaluation and Participation	15 %

Additional Work Products	10%
Memoranda	
Graphics assignments	
Mini-design project submissions	

## ***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 presentation.

### ***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 documentation of the design process, calculations and graphics will form a significant portion of the evaluation. The reports demonstrate the quality of the design process followed and the robustness of the proposed solution.

### ***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 instructor's 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. Any acts that suggest academic dishonesty e.g., plagiarism or cheating, will 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 Life, 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 Life and they will contact all your instructors for you. 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 Life in 110 Bray Hall. Staff in this office will discuss the ESF process and work with you to access supportive services. If you have a learning disability, the College requires you to provide supportive documentation and will 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 is the second offering of FEG 133 using this course number. Dr. James Hassett taught the course as FEG 296 in 2008: it combines material from the one-credit FEG 300 and ERE 225 courses previously taught by Professor Doug Daley. We thank the prior instructors for providing materials for use in this class.

## FEG 133 Lecture Schedule for 2010

Week	Session	Topics	Readings to be discussed*	Submissions
1	19-Jan	Introduction to engineering; Brainstorming		
	21-Jan	Communication – graphics	D&L Chapter 8	
2	26-Jan	Introduction to engineering design	D&L Chapter 1	
	28-Jan	Mini design – paper airplanes		Airplane design sheet due
3	2-Feb	The design process; Communication	D&L Chapter 2, T Chapter 1	Geospatial project memo due
	4-Feb	Defining the problem	D&L Chapter 3 & 4	
4	9-Feb	Writing – getting going	D&L Chapter 9.3, T Chapter 2	
	11-Feb	Communication – oral	D&L Chapter 9	
5	16-Feb	Design alternatives	D&L Chapter 5	
	18-Feb	Geospatial project presentations		
6	23-Feb	Mini design project – Lego bridges		Geospatial project report due
	25-Feb	Team dynamics and project management	D&L Chapter 10	
7	2-Mar	Prototypes	D&L Chapter 7	
	4-Mar	Writing – openers	T Chapter 3	
8	9-Mar	Mini design project – spaghetti towers		Ecological Eng. project memo due
	11-Mar	Mini design project – spaghetti tower testing		
9	16/18-Mar	<i>Spring Break</i>		
10	23-Mar	Writing – middles and closers	T Chapter 4 & 5	
	25-Mar	Ecological Engineering project presentations		
11	30-Mar	Writing – diction and readability	T Chapter 6 & 7	Ecological Eng. project report due
	1-Apr	Mini design project – catapult		
12	6-Apr	Writing – superstitions and critical analysis	T Chapter 8 & 9	
	8-Apr	Writing – revising and proofreading	T Chapter 10 & 11	
13	13-Apr	Writing – other thoughts	T Chapter 12 - 15	Water Resources project memo due
	15-Apr	Mini design project – egg drop design		
14	20-Apr	Mini design project – egg drop testing		
	22-Apr	Lifelong learning		
15	27-Apr	Future design considerations	D&L Chapter 11	
	29-Apr	Engineering ethics	D&L Chapter 12	
16	4-May	Water Resources project presentations		Water Resources project report due

\*Reading source

D&L: C. L. Dym and P. Little, *Engineering Design*, 3<sup>rd</sup> Edition

T: J. R. Trimble, *Writing with Style*, 2<sup>nd</sup> Edition

## FEG 133 Lab Schedule for 2010

Week	Session	Topics	Assigned Graphics Exercises <sup>a</sup>
1	21-Jan 12:30 – 3:20	AutoCAD Chapter 1	P1-1, P1-2, P1-3
2	28-Jan 12:30 – 2:10	Geospatial project work time	
	2:20 – 3:20	AutoCAD Chapter 2	P2-1, P2-2, P2-3, P2-6, P2-21, P2-23, P2-24, P2-25
3	4-Feb 12:30 – 2:10	Geospatial project work time	
	2:20 – 3:20	AutoCAD Chapter 3	
4	11-Feb 12:30 – 2:10	Geospatial project work time	
	2:20 – 3:20	AutoCAD Chapter 3	P3-2, P3-2, P3-4, P3-5
5	18-Feb 12:30 – 3:20	AutoCAD Chapter 4	P4-1, P4-2, P4-3
6	25-Feb 12:30 – 2:10	Ecological Engineering project work time	
	2:20 – 3:20	AutoCAD Chapter 5	
7	4-Mar 12:30 – 2:10	Ecological Engineering project work time	
	2:20 – 3:20	AutoCAD Chapter 5	P5-5, P5-6
8	11-Mar 12:30 – 3:20	Ecological Engineering project work time	
9	18 Mar	<i>Spring Break</i>	
10	25-Mar 12:30 – 3:20	Ecological Engineering project work time	
11	1-Apr 12:30 – 3:20	Water Resources project work time	
12	8-Apr 12:30 – 3:20	Water Resources project work time	
13	15-Apr 12:30 – 3:20	Water Resources project work time	
14	22-Apr 12:30 – 3:20	Water Resources project work time	
15	29-Apr 12:30 – 3:20	Water Resources project work time	

Footnote:

<sup>a</sup> Graphics exercises are due at the start of the lab period one week from when they are assigned