

NORTHEASTERN UNIVERSITY
College of Engineering

Engineering Design
GEU 110 COURSE OUTLINE

Course Number:	GEU 110	Instructor:	Dr. Richard Whalen
Quarter Offered:	Spring 2006	Office:	311 Snell Engineering
Total Credit Hours:	4 credits	E-mail:	r.whalen@neu.edu
Weekly Format:	2 Lectures, 1 Lab	Phone:	(617) 373-4706
		Web:	www.coe.neu.edu/~whalen

Office Hours: Monday & Thursday 3:30 - 4:30, Wednesday and 11:45 - 12:45 p.m., Other times by appointment.

COURSE GOALS:

- Introduce students to the engineering profession and creative engineering problem-solving through design projects, presentations, and activities.
- Familiarize students with the various engineering disciplines and their interrelationships.
- Provide historical perspective on engineering design processes, successes, challenges, and failures and their influence on contemporary society.
- Inspire and instill an appreciation for the engineering profession, its ethics, and practices.

COURSE OBJECTIVES:

- Learn and apply all of the steps of the engineering design process in proposing and building working devices or models in design projects.
- Design and construct a working device or model that meets preset constraints and specifications.
- Review and evaluate engineering failures and successes for their relationships to engineering design problems, solutions, and processes.
- Conduct a needs assessment to design a product or engineer a solution by applying the engineering design process steps and documenting and reporting on each phase.
- Describe the scientific principles and technical background required for the proposed design project;
- Outline the patents related to the proposed design and evaluate their pertinence to the solution.
- Apply the engineering principles revealed in class exercises on teamwork, creativity, problem solving, and on evaluation, selection, and implementation of solution alternatives.
- Develop and apply drawing and sketching skills to communicate design and engineering information graphically. Apply the principles of orthographic projection in engineering design.
- Learn and practice technical drawing and engineering graphics communication using AutoCAD. Apply skills of technical drawing to specific engineering projects.
- Formulate engineering problems for numerical solutions, conduct relevant computations, analyze, organize and present results using Excel software
- Create and deliver individual and team presentations on engineering design projects and topics.
- Generate a report for the design project that reflects work completed in each step of the design process and presents technical drawings that apply to the approved design.

Skills and perspectives relate directly to the shared goals of Northeastern University's Academic Common Experience (ACE) initiative.

REQUIRED MATERIALS:

1. *Engineering by Design 2nd ed.*, Gerard Volland, Prentice Hall, NJ (2004).
2. *Discovering AutoCAD 2005*, Mark Dix & Paul Riley, Prentice-Hall, NJ (2006).
3. 3.5" diskette; optional: Zip[®] disk or memory stick to transport & back up all of your AutoCAD work.

RECOMMENDED MATERIALS & SOFTWARE USED FOR SKILL--BASED LEARNING:

1. Reading: *Introduction to Excel 2004*, D. Kuncicky, Prentice-Hall Publishing Company, NJ (2004).
2. Software: *Microsoft[®] Excel or Microsoft Office '97, 2000 or XP with Word and Excel*.
3. Software: *AutoCAD[®] 2005 (or AutoCAD 2004)*.

CAD LABORATORY:

208 Sn is the ECALC Lab: Each **Thursday**, the Lab module will be held in this facility.

EVALUATION:

Final course grades will be computed using the following percentages:

15%	Minor Design Project
25%	Homework: AutoCAD and Design Exercises
20%	In-class Design Exam (10%) and Quizzes (2@5%)
25%	Major Design Project
15%	Final Exam

The Major Design Project will include a variety of interim assignments so that the instructor can provide feedback throughout the process. The final technical report should include all relevant material contained in the earlier assignments and previously submitted work (possibly edited). Students are responsible for ALL topics covered in class and ALL assignment material. Design quizzes and examinations are CLOSED BOOKS and CLOSED NOTES. Late assignments are not acceptable.

ETHICAL BEHAVIOR:

No collaboration is allowed on individual assignments under penalty of failure. Plagiarism, cheating, and any form of unauthorized collaboration will not be tolerated and will be handled in accordance with University policies described in the Student Handbook. All engineering majors should be familiar with the Honor Code of our College of Engineering that is included in the GEU 100 course material, and with professional engineering codes of ethics (see, for example, the NSPE Code of Ethics presented in the *Engineering by Design* textbook on pages 511-514).

Although students are encouraged to discuss homework assignments and work together to develop a deeper understanding of the topics presented in this course, submission of others' work, efforts, or ideas as your own is not permitted. Each student is expected to prepare and submit his/her own programs, reports, drawings, and other materials unless otherwise designated as collaborative work.

Copying of computer files, documents, spreadsheets, or drawings is not allowed. If two students' work is suspiciously similar, a penalty may be assessed to both students. If a situation arises in which you are uncertain if cooperation with another student would constitute cheating or some other violation of the honor code, please ask the instructor for guidance and clarification of these rules. Suspected violators will be referred to the Student Court for review, where penalties may include but are not restricted to: zero credit on the work, student placed on probation, submission of judicial findings in the students' permanent record, and jeopardy of the students' status in the Engineering Program.

Tentative Schedule for Spring 2006

<i>Week of</i>	<i>Day 1 Monday</i>	<i>Day 2 Wednesday</i>	<i>Day 3 Thursday AutoCADLAB</i>
January 8	First Day! Introduction, syllabus, fill out class info cards, discuss types of engineers etc. Student Introduction Assignment 1 handout.	Engineering Design Process, Nth Generation Design , Current Practices. Assignment: Read Chap 1	Chapter 1: Lines; Getting Started Chapter 2: Circles; Other Objects
January 15	MLK Day No Class	Homework Presentation	Wright Flyer Movie, Questionnaire.
January 22	Assignment: Read Chap 2. Needs Assessment. Presentation Sign ups. PowerPoint Cross view article	Engineering Graphics Assignment: Read Chap 3 Report Writing Assignment: Graphics Handout. Building Projects assigned	Chapter 3: Layers, Colors, Fillet; Multiviews, Zooming & Previewing
January 29	Presentations for case studies. Assignment: "Saw it in the Movies " Assignment	Case Study Review Needs Assessment, Structuring the search for a problem, Dunker Diagrams, KT Analysis Assignment: Read Chap 4,5. Structuring Search for Solution, Coin problem	. Chapter 4: Template Drawings; Array Handout. Building Projects assigned
February 5	Intellectual Property.	"Saw it in the Movies" Presentations	Chapter 5: Arcs & Polar Arrays; Rotate
February 12	Building Project Presentation / Demonstration.	Building Project Demonstrations. Write 5 interview questions to ask a potential design team member.	AutoCAD Quiz 1 in Lab Chapters 1-5
February 19	President's Day No Class	Design Group Assignment Exercise	Team Building Exercise. Towers Etc. Assignment: Read Chp 6, 7. Assignment: Design project.
February 26	Exam Closed Book / Notes Chp 1-5;	Assignment: Read Chp 8. Abstraction / Synthesis Brainstorming Exercise Design Phase 1 Due	EXCEL REVIEW: a) Budgeting - Project b)Plotting & Graphing Data Trendlines
March 5	Spring Break	Spring Break	Spring Break
March 12	Exam Review / Product Liability; Assignment: Design Deconstruction Assignment	Engineering Disasters Movie Assignment: Liability Presentations Assignment; Read Chp 9 Design Phase 2 Due	Chapter 6: Object Snap; Break, Extend
March 19	Phony Slideman Exercise	Failures / Hazards Analysis. Analytical Decision Making Assignment: Read Chap 10. Design Phase 3 Due	Chapter 7: Text & Dimensions; Editing
March 26	Disasters / Liability Group Presentations;	Manufacturing and Design for X	Chapter 8: Dimensions & Dimensioning Design Phase 4 Due
April 2	Design Deconstruction Presentation or Reverse Engineering Exercise	Chapter 9: Polylines; More Shapes: Polygons, Donuts, Points, Solids, Splines Solids Tutorial	AutoCAD Quiz 2 in Lab Chapters 1- 9: Design Phase 5 Due
April 9	Final Exam Review; Design Group Final Meeting	Project Presentations	Project Presentations
April 16	Patriots Day No Class	Project Presentations	No Class
April 23	Final Exam Week	Final Exam Week	Final Exam Week