

NORTHEASTERN UNIVERSITY
College of Engineering

Engineering Design
GE 1103 COURSE OUTLINE

Course Number: GE 1103
Quarter Offered: Fall 2002
Total Credit Hours: 4 credits
Weekly Format: 2 Lectures, 1 Lab

Instructor: Prof. Beverly K. Jaeger
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Office Hours: Tuesdays 1:00 - 2:30 p.m., Wednesdays 1:00 - 2:00 p.m., Other times by appointment

COURSE GOALS:

- Introduce students to the engineering profession and creative engineering problem-solving through design projects, exercises, and activities;
- Have students become familiar with the various engineering disciplines and understand their interrelationships;
- Provide a historical perspective on engineering design and its influence on contemporary society;
- Inspire and instill an appreciation for engineering, the engineering profession, and its practices.
- Recognize the need for informed ethical and historical perspectives of one's profession.

COURSE OBJECTIVES:

- Design and construct a working device or model that meets preset constraints and specifications;
- Apply all of the steps of the design process in building a working device or model in design projects;
- Design a product or engineer a solution to a problem 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;
- Review and evaluate engineering failures and successes for their relationships to engineering design problems, solutions, and processes;
- 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;
- Learn and practice technical drawing using AutoCAD; Apply the principles of orthographic projection in engineering design. Apply skills of technical drawing to specific engineering projects;
- Create and deliver a presentation as a team on the major engineering design project;
- Generate a report for the design project that reflects the 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*, Gerard Voland, Addison-Wesley Publishing Company, Reading, MA (1998).
2. *Discovering AutoCAD 2002*, Mark Dix & Paul Riley, Prentice-Hall Publishing Company, NJ (2002).
3. Two 3.5" diskettes; optional: Zip[®] disk. Come to lab prepared to back up all of your AutoCAD work.

CAD LABORATORY:

208 Snell Engineering is the ECALC Lab: Each Friday, the AutoCAD module will be held in this computer laboratory.

EVALUATION:

Final course grades will be computed using the following percentages:

10%	Minor Design Project
15%	Homework and Attendance
20%	In-class Design Exams and/or Quizzes
25%	AutoCAD: Homework - 15%, Quizzes - 10%
30%	Major Design Project: Term Progress - 15%, Technical Report - 10%, Presentation -5%

The Major Design Project will include a variety of interim assignments so that the instructor can provide feedback. The final technical report should include all relevant material contained in the earlier reports and previously submitted work (possibly edited). Students are responsible for ALL topics covered in class and ALL assignments. 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 dealt 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 GE 1001 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 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 indicated. Copying of computer files, documents, 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.

COURSE OUTLINE

Proposed Schedule

WEEK	TOPICS & READING	DESIGN ASSIGNMENTS: Due as dated; TEXT: Voland	AUTOCAD ASSIGNMENTS: Due following week in lab. TEXT– Dix & Riley
September 19-20	Course Overview Chapter 1	#0D - I Like/Dislike this Design #1D - Engineering Design Analyses Problems 1.1.2 & 1.10, pp. 21-23	No Lab this week; Begin Reading AutoCAD text
September 23-27	Design Process Chapter 2	#2D- Chapter 2 Cases Selected; Minor Project Described & Assigned	Ch. 1 Lines and Ch. 2 Circles #2A Drawing Problems Assigned
Sept 30- October 4	Cases Presented Needs Assessment Chapter 3	#3D Minor Design Project Handout: Proposal and Presentation Dates given	Chapter 3 Layers, Colors, Fillet #3A probs 3.14 & 3.18, p. 116, 124
October 7-11	Problem Definition & Formulation Chapter 4	#4D Wright Brothers Worksheet; Identify interest areas for Major Design Project	Chapter 4 Template Drawings #4A prob 4.13, p. 162 Chapter 5 Arcs, Polar Arrays #5A probs 5.10 & 5.12, p 196, 200
October 15-18	Solution Search Ergonomics Chapter 5	Minor projects due, #5D What I learned from Minor projects.	AutoCAD Quiz #1 in Lab Open book Open Notes
October 21-25	Review, reflect Chapter 6	Quiz # 1 on Design #6D Ergonomic considerations for Design project	Chapter 6 Object Snap #6A probs 6.14 & 6.19 Chapter 7 Text, Dimensions #7A prob 7.16
Oct 28- November 1	Techn Knowledge Chapter 7	#7D Design project – do background research, technical background and patent search	Chapter 8 Dimensions #8A probs 8.15 & 8.19
November 4-8	Abstraction, Modeling and Synthesis Chapter 8	#8D Design alternatives for project as result of design meeting.	Chapter 9 Polylines #9A probs 9.19 and assigned object to draw
November 11-15	Ethics, other Chapter 10	Quiz #2 Design material to date Find cases of unethical behavior	Solid Modeling Tutorial

November 18-22	Design Analysis Chapter 11	#9D Analysis of design alternatives for project.	Oct. 19: AutoCAD Quiz #2 in Lab Open book Open Notes
November 25-27	Implementation	Work on Major Design Projects	<i>No lab - Holiday</i>
December 2-4	Project Presentations	Project Presentations and Evaluations	