GEU110— ENGINEERING DESIGN— Fall 2003

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Electrical and Computer Engineering
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OFFICE HOURS: Thursdays 10:00AM–12:00 Noon (302 Stearns) or by appointment.

These office hours are the two that I have set aside specifically for students in my classes. However, I know your questions will not always follow a schedule. Please feel free to contact me by electronic mail. I normally check my electronic mail frequently throughout the day, from about 9AM until 11PM (including weekends: OK, truthfully, I'm not usually too good at 9AM on weekends). Student questions will be answered as quickly as possible. When I am on travel, I normally read e-mail each evening.

If that doesn't work, call my office phone and listen to the voice mail message. My pager number is in that message, unless I am out of town. In that case, the message will give you further instructions on how to reach me. The same policy applies on weekends.

TEXT: Voland, Gerard, *Engineering by Design*, Addison-Wesley Publishing Company, Reading, MA (1998).

Dix, Mark, & Paul Riley, *Discovering AutoCAD 2002*, Prentice-Hall Publishing Company, NJ (2002).

OTHER RESOURCES: Two 3.5" diskettes.

Optional, Zip disk.

LOCATION: 235 FR on Mon and Thu, and 429 Dana on Wed.

TIME: Mon, Wed, Thu, 1:35–2:40PM

COURSE GOALS:

- Introduce students to the engineering profession and creative engineering problem–solving through design projects and exercises
- Inspire and instill a love for engineering and the engineering profession
- Have students become familiar with the various engineering disciplines and understand their interrelationships
- Provide a historical perspective on engineering design and its impact on society today

COURSE OBJECTIVES:

- Design and build a working device or model that meets constraints and specifications
- Apply the steps of the design process in building the working device or model
- Design a product or solution to a problem applying the steps of the design process, documenting and reporting on each step
- Describe the scientific principles required for the design project
- List the patents related to the design and explain or evaluate their pertinence to the solution
- Review and evaluate engineering failures and successes for their relationships to engineering design problems and solutions
- Determine the engineering principles revealed in class exercises on teamwork, creativity, problem solving, evaluation of alternatives
- Practice technical drawing using AutoCAD. Apply the principles of orthographic projection. Apply the skills of technical drawing to engineering projects
- Use drawing and sketching skills to communicate design and engineering information
- Create a presentation as a team on the design project
- Create a report for the design project that reflects the work done in each step of the design process and technical drawings that apply to the design
- Recognize the need for informed ethical and historical perspectives of one's profession

GRADING:

5 % on AutoCAD lab work (All L–x)
10 % on AutoCAD homework (All A–x)
10 % on AutoCAD Quizzes (Q1,2)
10 % on Minor Design Projects (D4,P5)
25 % on Major Design Projects (D6,10,11,P9)
20 % on Exams (E1,2)
10 % on Homework (D1,2,3,5,7,8,9)
10 % on Participation (P1,2,3,4,6,7,8)

CIVILITY IN THE CLASSROOM:

I will treat my students with respect, by being prepared for my lectures, grading your work carefully, answering your questions, and making myself available to you as much as possible. Please treat me, our teaching assistants, and your fellow students with respect, by observing the following rules. (1) Please silence all pagers, telephones, and other electronic devices and put them in your pocket or bookbag, before entering the classroom (This rule applies to the laboratory as well). (2) If you think you might have to leave the room during the class, sit near the door to minimize the disturbance to others. If you do leave, please do not return until after the class has ended. (3) If you arrive after the class has started, please take a seat close to the door to minimize the interruption of the class.

ETHICAL BEHAVIOR: No collaboration is allowed under penalty of failure. Plagiarism and cheating will not be tolerated; they 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 as your own is not permitted. Copying of computer code is not allowed. Each student is expected to prepare and submit his/her own programs, reports, drawings, and other materials. 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. 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 information on judgement in the students' permanent record.

SPECIAL NEEDS: The university will make reasonable accommodations for persons with documented disabilities. Students should notify the Disability Resource Center located in 20 Dodge Hall and their instructors of any special needs. Instructors should be notified the first day of classes.

Table 1

Multiplier Prefixes

10^{-18}	atto–	a–	10^{-18} boys = 1 attoboy
10^{-15}	femto–	f–	Your Idea Here
10^{-12}	pico–	p–	10^{-12} boos = 1 picoboo
10^{-9}	nano–	n–	10^{-9} goats = 1 nanogoat
10^{-6}	micro–	μ–	10^{-6} scopes = 1 microscope
10^{-3}	milli–	m–	10^{-3} cents = 1 Millicent
10^{3}	Kilo–	k–	2×10^{3} mockingbirds = 2 kilomockingbirds
10^{6}	Mega–	M–	10^{6} phones = 1 megaphone
10^{9}	Giga–	G–	10^{9} los = 1 gigalo
10^{12}	Tera–	T–	10^{12} bulls = 1 terabull
10^{15}	Peta–	P–	10^{15} lumas = 1 Petaluma
10^{18}	Exo–	E–	10^{18} skeletons = 1 Exoskeleton

Syllabus

Week 1 **10,11 Sep**	**Lecture Topic:** ADMINISTRIVIA. **Lecture Topic:** INTRODUCTION; Course overview.
Week 2 **15,17,18 Sep**	**Class Reading before Monday:** Voland Ch. 1 and 2. **Class Homework Due in Class Monday:** D1. Design you like or dislike.. **Lecture Topic:** The Design Process: Needs Assessment. **In–Class Activities:** P1: Student Presentations of D1 Thu 18 Sep. **Lab Reading Before Wednesday:** Ch.1 and 2, Lines and Circles. **In–Lab Activity — Complete During Lab:** Dix 1.11 and 1.12.
Week 3 **22,24,25 Sep**	**Class Reading before Monday:** Voland Ch. 2. **Class Homework Due in Class Monday:** D2. Ch. 2 Case Studies. **Lecture Topic:** Need and Reasons for Engineering. **In–Class Activities:** P2: Wright Brothers Movie, Mon 22 Sep. **In–Class Activities:** P3: Case Study Presentations, Thu 25 Sep. **Lab Reading Before Wednesday:** Dix Ch 3; Layers, Colors, Linetypes, Fillets. **Lab Homework Due this Wednesday:** Dix, 2.13, 2.16, 2.17. **In–Lab Activity — Complete During Lab:** Dix 3.13, Layered Drawings.
Week 4 **29 Sep, 1,3 Oct**	**Class Reading before Monday:** Voland Ch. 3. **Class Homework Due in Class Monday:** D3. Design Interest. **Lecture Topic:** Problem Search. **In–Class Activities:** P4: Building with limited materials. **Lab Reading Before Wednesday:** Ch. 4 and 5. Templates, arcs. **Lab Homework Due this Wednesday:** Dix 3.16 and 3.18. **In–Lab Activity — Complete During Lab:** Dix 4.10.

Week 5 **6,8,9 Oct**	**Class Reading before Monday:** Voland Ch. 1 (Review). **Class Homework Due in Class Monday:** D4. Ping–Pong Launcher Report. **Lecture Topic:** Engineering Design Process. **In–Class Activities:** P5: Ping Pong Launcher Demonstration. **In–Lab Activity — Complete During Lab:** AutoCAD Quiz 1.
Week 6 **15,16 Oct**	**No class Monday, 13 October** **Class Reading before Monday:** Voland Ch. 3. **Class Homework Due in Class Monday:** D5. Group Meeting Report. **Lecture Topic:** Problem Search and Formulation. **In–Lab Activity — Complete During Lab:** EXCEL: Math and Budgets.
Week 7 **20,22,23 Oct**	**Class Homework Due in Class Monday:** D6. Design Project; Proposal. **Class Reading before Monday:** Voland Ch. 4. **Lecture Topic:** Engineering Design in a Small to Medium–Sized Business, by Dr. Jay Eastman, Lucid Technologies, Inc., Monday 20 Oct. **In–Class Activities:** P6: In–Class Exercise: The Helicopter, Thu 26 Oct. **Lab Reading Before Wednesday:** Dix Ch. 6 and 7; Object Snap, Text. **Lab Homework Due this Wednesday:** Dix 4.13, 5.9 and 5.12. **In–Lab Activity — Complete During Lab:** Object Snap, Dimensions.
Week 8 **27,29,30 Oct**	**Class Reading before Monday:** Voland Ch. 5. **Lecture Topic:** Solution Search. **In–Class Activities:** E1: Exam 1, Thu 30 Oct. **Lab Reading Before Wednesday:** Dix Ch. 8 Dimensions. **Lab Homework Due this Wednesday:** Dix 6.14, 6.19, 7.13, and 7.16. **In–Lab Activity — Complete During Lab:** Hatching.

Week 9 **3,5,6 Nov**	**Class Homework Due in Class Monday:** D7. Design Project Alternatives. **Class Reading before Monday:** Voland Ch. 6. **Lecture Topic:** Technical Knowledge. **In–Class Activities:** P7: Engineering Disasters Movie Thu, 6 Nov. **Lab Reading Before Wednesday:** Dix Ch. 9. **Lab Homework Due this Wednesday:** Dix 8.14 and 8.16. **In–Lab Activity — Complete During Lab:** Polylines.
Week 10 **10,12,13 Nov**	**Class Homework Due in Class Monday:** D8. Design Project: Graphics and Sketching. **Class Reading before Monday:** Voland Ch. 7. **Lecture Topic:** Abstraction, Modeling and Synthesis. **In–Lab Activity — Complete During Lab:** Quiz 2.
Week 11 **17,19,20 Nov**	**Class Reading before Monday:** Voland Ch. 8. **Lecture Topic:** Analysis, Cost Proposals. **In–Class Activities:** P8: An In–Class Costing Exercise: The Throne, Mon, 17 Nov. **Lab Homework Due this Wednesday:** Dix 9.16 ad 9.19. **In–Lab Activity — Complete During Lab:** EXCEL: Decision Matrix. POWERPOINT: Presenting Solutions.
Week 12 **24,26 Nov**	**Class Homework Due in Class Monday:** D9. Design Project: Costing. **Class Reading before Monday:** Voland Ch. 10. **Lecture Topic:** Ethics and Intellectual Property. Patents, Publications, Talks (Guest Lecture by Dr. Anthony Pirri), Mon, 24 Nov **No Lab Wednesday, 26 November (Thanksgiving)** **No Class Thursday, 27 November (Thanksgiving)**
Week 13 **1,3,4 Dec**	**Class Reading before Monday:** Voland Ch. 11. **Lecture Topic:** Implementation. **In–Lab Activity — Complete During Lab:** Time to Work on Project Drawings, Computations, and Presentations.

Week 14 **8,10,11 Dec**	**In–Class Activities:** P9: Major Project Presentations. **Lecture Topic:** Course Overview.

Final Project Reports Due Electronically by Midnight, Thursday, 11 December

Student Information Sheet

Name: _____

Email Address: _____

The following questions will help me plan the course to meet your needs more effectively.

Field of Engineering: _____
This is for information only. If you are undecided, but leaning toward a particular field, then say "leaning toward. . . ." If you have no idea, then leave blank.

AutoCAD Experience: _____ Excel: _____

Computer Experience: _____

_____

What is your major strength? _____

What is your major weakness? _____

Do you have any design experience? _____

_____

What would you like to learn from this course? _____

_____