

ENGR 100 Introduction to Engineering and Design, Cuyamaca College

Fall Semester 2009, Section 1237

Thursday, 1:00 – 3:50 pm, Room F301

Introduction to engineering as a way of perceiving the world, including an overview of design and analytical techniques, problem solving and strategic thinking, disciplines, history, and ethics. Fundamentals of engineering graphics as a universal language, and application to the visualization, representation, and documentation of designed artifacts. This course focuses on the design process and on spatial reasoning and visualization.

Instructor

Dr. Duncan McGehee

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Cuyamaca College Engineering Website: www.cuyamaca.edu/engr.

Office Hours: MW 5 - 6 pm, T 6 - 7 pm, W 2 – 3 pm, Th 12 – 1 pm, or by appointment

Units and Prerequisites

3 units. No prerequisites.

Text

Required:

Engineering Graphics: Tools for the Mind (with DVD). B. Graham, ISBN 978-1-58503-412-3, SDC Publishing Co., 2007.

Other Required Supplies

Scientific calculator

Quad ruled bound notebook, 9.75" x 7.5" format

High quality ortho graph paper (4 squares/inch, 8.5" x 11", 70 sheets)

High quality isometric paper (8.5" x 11", 30 sheets)*

Mechanical Pencil – 0.7 mm or 0.9 mm (if you don't already have one of these, choose 0.9 mm)

Leads - HB

Box of soft lead primary color pencils

White vinyl eraser

1 inch white 3-ring binder

Plastic sheet protectors

Access to a personal computer

Grading

A: 90 - 100

B: 80 - 89.9999

C: 70 - 79.9999

D: 60 - 69.9999

F: < 60

Drawing portfolio	45%
Design Project 1 – Puzzle Cube	10%
Design Project 2 – Team Design Proj.	15%
Homework and other projects	15%
Final Examination	10%
Class and lab participation	5%
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	100%

Extra credit: e-choices career assessment 2%

Important Dates

4 September: Final day to add classes, or to drop without a 'W'.

12 November: Final day to drop classes.

*Do the following to print your own isometric graph paper

1. Go to the following website: <http://www.incompetech.com/beta/hexagonalGraphPaper/triangle.html>

2. Select the following options:

PDF Document Size: 8.5 x 11 inches

Minimum Border: 0.1 inches

Line weight: 0.7 pts

Triangle side length: 0.25 inches

Triangle colour: Light grey

3. Once you have produced the pdf file, save it on your computer so you can re-use it.

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Course Objectives (Expected Student Learning Outcomes)

Students will be able to:

- 1) Describe the role of the engineer in our society as a critical thinker, innovator, and problem solver. Differentiate among the various disciplines of engineering, describing typical projects done within each, and describing the necessary academic preparation and reasons for each.
- 2) Apply engineering design methods and strategic thinking to solve problems in the development of new or improved products.
- 3) Apply engineering analytical skills and methods to solve real world problems, including for example the application and conversion of units.
- 4) Use appropriate written and oral forms of technical communication to present, explain, and justify engineering design decisions.
- 5) Apply engineering graphics as a universal language for technical communication:
 - a. Draw freehand technical sketches which demonstrate knowledge of basic engineering conventions, including the American standard arrangement of views, the use of a title block, standard drawing sizes, basic line types, proper dimensioning technique.
 - b. Apply techniques of descriptive geometry and spatial reasoning to represent 3-dimensional objects in 2 dimensions. Translate single-view pictorials into multi-view orthographic drawings. Given two orthographic views, draw a third orthographic view and a single-view pictorial.
 - c. Given a real object, draw all necessary orthographic, pictorial, sectional, and auxiliary views. Include sufficient but not excessive dimensions.
- 6) List the basic ethical rules governing engineers and apply them in ethically murky situations.

Policies

- 1) This course stresses teamwork, particularly on Design Project 2. It is vital that all communication remain respectful and courteous.
- 2) Timeliness is a vital part of engineering. This means 2 things:
 - a) Don't be late for class.
 - b) Late homework, lab projects, and design projects will not be accepted unless you have arranged it with the instructor *before* the class meeting when they are due.
- 3) Cell phones must be off before class begins. This includes text messages transmitted and received.

The Design Notebook

1. Put your name, phone number, and email address on the cover. Also label your first notebook Design Notebook #1, and write the present date with a hyphen. So for example if you're starting the notebook on August 30, 2009, write Aug 30, 2009 - . When you have filled up all pages of the notebook, write the ending date on the front cover, and start Design Notebook #2.
2. Put an index on the first page.
3. Date and number every page.
4. *Never* tear out a page.
5. Leave no blank pages between used pages. Draw a big X through any such blank pages.
6. Write in ink, preferably, or if you write in pencil, NEVER ERASE. Instead, draw a big X through any calculations or drawings that you believe are in error.
7. Paste in computer outputs, photos, etc.
8. Include all data, sketches, calculations, notes, etc.
9. Document meetings, including results and assigned tasks.

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Tentative Schedule

Date	Lecture Topic	Lab Topic
27 Aug	Intro, What is engineering?	Intro: Sketching
3 Sept	Design 1: Engineering design overview	Lettering, engineering drawings
10 Sept	Analysis 1: Engineering units and numbers	Orthographic projections 1
17 Sept	Design 2: Defining the design problem	Orthographic projections 2
24 Sept	Analysis 2: Selecting the right material	Isometric views 1
1 Oct	Design 3: Generating design ideas	Isometric views 2
8 Oct	Analysis 3: Structures	Oblique views
15 Oct	Design 4: Selecting the best design	Dimensioning
22 Oct	Analysis 4: Mechanical systems	Design Team meetings
29 Oct	Design 5: Documentation and prototyping	Assembly drawings, Puzzle cube design
5 Nov	Analysis 5: Digital circuits	Microcontrollers
12 Nov	Ethics 1	Auxiliary Views
19 Nov	Ethics 2	Design Team meetings
26 Nov	Thanksgiving	Thanksgiving
3 Dec	Design 6: Group Presentations	Section views
10 Dec	The future of engineering	Tolerances
17 Dec	Final Examination	

Additional books, magazines, and websites

Books

The Design of Everyday Things, Donald Norman, 2002.

Making It: Manufacturing Techniques for Product Design, Chris Lefteri, 2007.

Why Buildings Stand Up, Mario Salvadori, 2002.

The World Is Flat, Thomas Friedman, 2007.

Soul of a New Machine, Tracy Kidder, 2000.

The Existential Pleasures of Engineering, Samuel Florman, 1994.

Magazines

Technology Review

Wired

Make

Invention and Technology

Websites:

www.cuyamaca.edu/engr: Cuyamaca College's Engineering Website.

www.asme.org: The American Society of Mechanical Engineers (ASME) is the leading organization that mechanical engineers belong to. Good deals for students.

www.asce.org: The American Society of Civil Engineers (ASCE) is the leading organization of civil engineers.

www.ieee.org: The Institute of Electrical and Electronic Engineers (IEEE) is the leading organization of electrical engineers.

This course adheres to policies outlined in the Cuyamaca College Catalog. For further information, please see the section of the catalog entitled *Academic Policies*.

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