Lecture #1
- History of Engineering
- History of Engineering Graphics and Tools
- Outline of this Course
- Administrative Details
Engineering 28

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Engineering 28

• **NOT** a drafting class
• Visualization, analysis, design modeling, documentation
• **NOT** an CAD class
• AutoCAD and Solidworks are the tools that we use
Prof. D.K. Lieu

- Taught this course for over 15 years
- Wrote the textbook
- Graduate of Lowell High School
- Graduate of UC Berkeley, BSME, MSME, PhD
- Specialization in electro-mechanical device design, sports equipment design
History of Engineering

Ancient history...

- tombs of the pharaohs
Pyramid Mystery

- ?
History of Engineering

- Roman Arch

Roman aqueduct, 19 B.C.
History of Engineering

• Roman Road

Roman Road, near Rome, 300 B.C.
History of Engineering

• Roman Arch and Roman road still in use today
• Marcus Vitruvius (1st century B.C.) provided written records of Design and Construction
• These records, in modernized form still exist today.
History of Engineering

Medieval Era…

- Flying Buttress

Notre Dame Cathedral
History of Engineering

Increased use of drawings to document engineering designs…
History of Engineering

Increased use of drawings to document engineering designs…
History of Engineering

- Water Mill (c.1160)
History of Engineering

- Drawing from c.1160 “textbook” by Abbess Herrad of Landsperg
- Perspective projection unknown
- Flattened and distorted, but records basic principles
History of Engineering

Large scale Civil Engineering projects…

Dutch windmill, 1513

Windmill 1745
History of Engineering

Use of drawing prior to fabrication…
History of Engineering

Use of drawing prior to fabrication…
History of Engineering

Use of drawing prior to fabrication…
History of Engineering

- Design of fortifications
- Simple wall geometries
History of Engineering

European fortifications, circa 1200
History of Engineering

• These type of fortification became obsolete.
• GUNPOWDER! CANNON! made all these types of fortification obsolete.
• New concept in fortification was needed
• Angled walls.
• Example: Fort McHenry, Fort Pitt, built in 1700’s
History of Engineering
History of Engineering

Close-up of a corner
History of Engineering

Section through a wall
History of Engineering

• Previous designs: simple analysis
• New design drove engineers crazy.

How much material?
Timber lengths?
Intersection shapes?
Walls, trusses, connectors?
History of Engineering

- France: THE prime military power in Europe until the 20th Century
- Gaspard Monge: Descriptive Geometry
- A state military secret
Use of descriptive geometry to find the area of plane XYZ
History of Engineering

• 1700's - appearance of engineering specialization. (Previously all military)

• 1750's - Civil Engineering (roads, bridges buildings). Military Engineering (forts, cannon, ships).

• 1850's - Mechanical Engineering (steam engines, boilers, machine tools)
History of Engineering

Industrial Revolution...
History of Engineering

• Mass production made accurate, formal drawings a necessity

• Engineering vs. art

• Patent drawings were another animal
History of Engineering

• 1875 - Electrical engineering (motors, generators, power distribution)
• 1895 - Chemical Engineering (dyes, solvents, polymers, chemical processes)
• 1950's - Nuclear Engineering (reactors, nuclear processes). Industrial Engineering (efficiency, material flow)
History of Engineering

Post Industrial Revolution...
History of Engineering

Modern...
Need for Graphic Communication

Designs are becoming more complex

- Visualize information received to produce or reproduce a design
- Analyze to ensure proper or optimal function
- Communicate information to others
- Record design history and changes
Tools for Engineering Graphics

Real old stuff…
Tools for Engineering Graphics

Old stuff…
Tools for Engineering Graphics

Newer stuff…
Tools for Engineering Graphics

The latest stuff…
Tools for Engineering Graphics
Tools for Engineering Graphics

2-D analysis of land
Tools for Engineering Graphics

3-D analysis of land
Tools for Engineering Graphics

Advanced analysis, not covered in this class..
Class Structure and Policies

• You must be officially enrolled in both the lecture section and a lab section
• Labs begin this week. Go to Lab, or you may be dropped from the class
• Labs will have an “open” format after this week
Class Structure and Policies

• Card key access: 5102 Etcheverry Hall, bring a check
• Computer facilities: 2105 and 2107 Etch
• Computer logins: use your own login
• USB drives; get them
• Home computers and software: highly advisable
Class Structure and Policies

• Software:
  – AutoCAD (try www.engineersrule.org)
  – Solidworks

• Homework
  – Assigned every week on Wednesday
  – Due Wednesday the following week, 3:00 PM
  – 50% off for late
  – Not accepted after one week
Class Structure and Policies

• Exams: 2 midterms, final exam
• Project: group design project
  hardware and drawings
• Books:
  – Visualization, Modeling and Graphics for
    Engineering Design Required
  – Engineering Design with Solidworks Recommended
Class Structure and Policies

• Tools: calculator, pencil, eraser, straight edge with mm scale, USB drive.
• Website http://www.me.berkeley.edu/e28
Class Structure and Policies

- Grading
  - 10% First Midterm
  - 20% Second Midterm
  - 30% Final Exam
  - 20% HW
  - 20% Project
Class Structure and Policies

Course Material

- Sketching Techniques
- Visualization Techniques
- Fabrication methods
- CAD Techniques
- Descriptive Geometry
- 3-dimensional Modeling
- Engineering Drawing
GSI’s (TA’s) and Readers

• Kim Lau
• Kai Fat Kwok
• Wil Tsai
End

• Questions?