



## E101 – Introduction to Engineering and Problem Solving



Dr. Bill Hunt, PE  
Sections 002 & 003  
Monday, November 10, 2008

## Agenda – 10Nov08


- Student Q&A – Dr. Hunt’s Absence
- Sample Questions for Mid-Term Exam
- Engineering Design (redux)
- Engineering Ethics
  - Gerard Hayes, Sony-Ericsson
- Reminders

State (finally) Wins! The Hunt’s were there!

## Mid-Term Exam Questions sample

- After her first year (including summer school) at NC State, Tiffany has 62 credit hours. What is her classification?
- What is a “C-Wall” class?
- Who is the Nuclear Engineering Faculty Advisor?
- Juan made an A in CH101, an A- in CH102, a B in ENG101, an A- in MA141, and a C+ in EC202. What is his Semester’s GPA?
- How many classes – and what kinds of classes are needed to minor in Spanish?

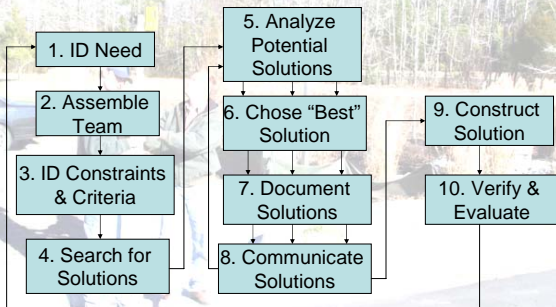



## Review: Engineering Design Methodology

- What are the Engineering Design Method Steps?  
Use your resources if you need to.



## Engineering Design Method

## Constraints

RESOURCES ARE NEVER INFINITE!




## Design Constraints Include

- Budget
- Time
- Personnel
- Legal
- Material
  - Availability
  - Properties
- Off-the-shelf Construction
- Manufacturability
- Competition

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## To be an Engineer

- Written by Herbert Hoover
  - the first engineer to become president
  - Responsible (in part) for Hoover Dam
- Will be posted on my website



Courtesy: Library of Congress

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## What are Engineering Ethics?



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## Using Ethics to Make Decisions

Utilitarianism:

Optimize the “Happiness Objective Function” (HOF)

$$\text{HOF} = \sum (\text{benefit})_i \times (\text{importance})_i - \sum (\text{harm})_j \times (\text{importance})_j$$

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## Utilitarianism to Make Decision

- Problem Statement:
- Small Town debates whether to lure trucking company into town.  
Advantages: improved tax base, so... better schools, revamp hospital, more jobs  
Disadvantages: Increased likelihood of death (1 per 5 years), more noise, more pollution

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## Utilitarianism to Make Decision

- With research you can apply the following benefits/costs x associated importance (COMMUNITY WIDE):
- Good schools: 80
- Hospital: 70
- Jobs: 100
- Death: 100
- Noise: 3
- Pollution: 14

Should the community pursue the trucking company?

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### What if yours is the 1 family every 5 years that loses a child?

- The cost associated with “death” increases from 100 to, say, 1,000,000
- What would their decision be?
- Does this change your opinion on what the town should do?

Engineering Tidbit: The average American’s life is worth \$6,000,000 (per *W. Kip Viscusi*)

### Example Ethical Issues



### Example Ethical Issues

- Dr. Hunt was hired by Firm AlphaWolf as a consultant in 2000 to do a project. In 2003, he later assisted the Town of Smith River with firm selection to design a large stormwater wetland. Firm AlphaWolf applied to the Town of Smith River to design the wetland.
- What should Dr. Hunt have done?

### Ethical Situations

- Firm WaterPure makes a device that



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of e's

### Ethical Situations

- Mrs. Hunt (also an engineer) worked for the state of NC. At a recent conference a vendor (contractor to the state) asked her to enter a drawing to win an IPOD.
- What should she have done?

### Ethical Situations

- Firm WannaPave has invested 1000’s of dollars in Dr. Hunt’s research program to conduct research. They “like” 85% of the research results, but not the other 15%. They ask Dr. Hunt NOT to publish that 15%.
- Should I cave to WannaPave?

### Pencil Me In...

- Dr. Hunt has worked for NCSU – off and on – since 1997. In that time I have (inadvertently) taken home some university purchased pens.
- Is this unethical?

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### The Ethical Engineer... (please write these down)

1. Protects Public Safety, Health, and Welfare
2. Performs Duties only in areas of competence
3. Is Truthful and Objective
4. Behaves in Honorable and Dignified Manner
5. Continues learning to sharpen skills

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### The Ethical Engineer... (please write these down)

6. Provides honest hard work to employers/clients
7. Informs proper authorities of harmful, dangerous, or illegal activities
8. Is involved with community and civic affairs
9. Protects the environment
10. Does not accept bribes or gifts to interfere with judgment

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### The Ethical Engineer... (please write these down)

11. Protects confidential information of employer or client
12. Avoids conflicts of interest

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### Take Home Point

- As an Engineer it is your duty to be ethical. If you “stray,” you may be compromising the public, and because we serve the public, you may be caught.
- Or...
- Make your mama proud.

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### Final Reminders

- Midterm next Week
  - 1 Hour. 2<sup>nd</sup> hour can be dedicated to team work.
- FEDD is only 2 weeks away (11/25)!
- Attend Co-op Session this month – if you haven't already
- Information regarding your final presentation (on 12/1) will be sent via email from your TA and/or me.

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