Engineering Ethics

ME 481
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Developed from Notes by Professor Craig W. Somerton

What does ethics mean to you?
Responses to sociologist Raymond Baumhart:

"Ethics has to do with what my feelings tell me is right or wrong."
"Ethics has to do with my religious beliefs."
"Being ethical is doing what the law requires."
"Ethics consists of the standards of behavior our society accepts."
"I don't know what the word means."

What does ethics mean to you?

Ethics (noun)
1. The study of moral standards and how they affect conduct (singular)
2. A system of moral principles governing the appropriate conduct for an individual or group (plural)

From MS Office Dictionary

Ethics

Refers to well based standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues.

Engineering Ethics

The field of applied ethics which examines and sets standards for engineers' obligations to the public, their clients, employers, and the profession.

Case Study:
The Engineering Parking Lot

The parking lot between the Engineering Building and the International Center is used extensively by engineering students. It is a pay lot, and not inexpensive for the several hours an engineering student usually spends in the Engineering Building. Many students leave their cars parked in the lot until after 11 pm, when the pay booths close, and drive out without paying the fee.
Questions

Q1: Is this an example of personal or professional ethics?
   Yes, personal ethics

Q2: Is there an ethical problem here?
   Yes, stealing.

Q3: Who’s being hurt?
   Individuals and the "institution"

Q4: In convincing yourself that there is not an ethical problem here, what are you doing?
   Rationalizing

In Engineering Ethics, we should never rationalize

There are many statements of engineering ethics.

Nearly, all of the engineering professional societies have such codes.

Though none of them are identical, they all have common themes.

The foundation for all of these codes is that the good of the public must be the over-riding concern for the engineer.

Standards or Codes of Engineering Ethics

Engineering: NSPE

Mechanical Engineering: ASME

NSPE Code of Ethics for Engineers

**Fundamental Canons**

Engineers, in the fulfillment of their professional duties, shall:
1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

ASME Code of Ethics of Engineers
([http://www.asme.org/Education/PreCollege/TeacherResources/Code_Ethics_Engineers.cfm](http://www.asme.org/Education/PreCollege/TeacherResources/Code_Ethics_Engineers.cfm))

**The Fundamental Principles**

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. Using their knowledge and skill for the enhancement of human welfare;
2. Being honest and impartial, and serving with fidelity their clients (including their employers) and the public; and
3. Striving to increase the competence and prestige of the engineering profession.

**The Fundamental Canons**

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence; they shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
3. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional and ethical development of those engineers under their supervision.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest or the appearance of conflicts of interest.
5. Engineers shall respect the proprietary information and intellectual property rights of others, including charitable organizations and professional societies in the engineering field.
6. Engineers shall associate only with reputable persons or organizations.
7. Engineers shall issue public statements only in an objective and truthful manner and shall avoid any conduct which brings discredit upon the profession.
8. Engineers shall consider environmental impact and sustainable development in the performance of their professional duties.
9. Engineers shall not seek ethical sanction against another engineer unless there is good reason to do so under the relevant codes, policies and procedures governing that engineer’s ethical conduct.
10. Engineers who are members of the Society shall endeavor to abide by the Constitution, By-Laws and Policies of the Society, and they shall disclose knowledge of any matter involving another member’s alleged violation of this Code of Ethics or the Society’s Conflicts of Interest Policy in a prompt, complete and truthful manner to the chair of the Committee on Ethical Standards and Review.

Solution Methodology for Engineering Ethical Problems
From Michael Davis, Ethics and the University (Routledge, London, 1999), pp. 166-167

Seven Step Guide

1. State the problem
   “There’s something about my decision that makes me uncomfortable” or “Do I have a conflict of interest?”

2. Check the facts
   Many problems disappear upon closer examination of situation, while others change radically.

3. Identify relevant factors.
   For example, persons involved, laws, professional code, other practical constraints (e.g., under $200).

4. Develop list of options.
   Be imaginative, try to avoid “Dilemmas”; not “yes” or “no” but whom to go to, what to say.

5. Test options.
   Use such tests as the following:
   - Harm test: Does this option do less harm than alternatives?
   - Publicity test: Would I want my choice of this option published in the newspaper?
   - Defensibility test: Could I defend this choice of option before a Congressional committee or committee of peers?
   - Reversibility test: Would I still think choice of this option good if I were adversely affected by it?
   - Colleague test: What might my profession’s governing board or ethics committee say about this option?
   - Organization test: What does the organization’s ethics officer or legal counsel say about this?

6. Make a choice based on steps 1 – 5.

7. Review steps 1 – 6. What could you do to make it less likely that you would have to make such a decision again?
   - Are there any precautions you can take as an individual (e.g., announce your policy on the question, change jobs, etc.)?
   - Is there any way to have more support next time?
   - Is there any way to change the organization (e.g., suggest policy changes at the next department meeting)?

The Method is Iterative and Analogous to the Engineering Design Method
Case Study: The New Professor

After completing her Ph.D. with a research project in nano-thermodynamics at an elite west coast university, Diana Gale has been hired as an assistant professor at a state university in the Midwest.
Diana was always an outstanding student, and her graduate studies were funded entirely from fellowships and research assistantships.
Shortly after arriving at State U, she is informed that she will be teaching the undergraduate thermodynamics course in the upcoming semester.
Always a very confident person, she feels very apprehensive as the start of the semester approaches.

1. State problem
Why does she feel apprehensive?
Though an expert in thermodynamics, she has never taught before.

2. Check facts
Yes, she has never taught before at any level.

3. Identify relevant factors
Is she violating an engineering ethical code?
She could be in violation of NSPE Canon #2 and ASME Canon #2 “Perform services only in areas of competence.”

4. Develop list of options.
She assembles five options:
i. Get teaching training
ii. Get a mentor
iii. Read up on teaching
iv. Read different thermo text books
v. Express concern to department chair
Test options

- Harm test: Does this option do less harm than alternatives?
  Option "v. Express concern to department chair." might do the most harm to her, others and the Department relative to the other options.

- Publicity test: Would I want my choice of this option published in the newspaper?
  Options “i. Get teaching training.” and “ii. Get a mentor.” would be positively reviewed by the public.

Test options (cont.)

- Defensibility test: Could I defend this choice of option before a Congressional committee or committee of peers?
  Options “i. Get teaching training.” and “ii. Get a mentor.” would be easy to defend.

- Reversibility test: Would I still think choice of this option good if I were adversely affected by it?
  All options would be well received by me if I was affected.

Test options (cont.)

- Colleague test: What might my profession’s governing board or ethics committee say about this option?
  Options: “i. Get teaching training.” is strong, “ii. Get a mentor.” is strong, “iii. Read up on teaching” is weak, “iv. Read different thermo text books” is weak, and “v. Express concern to dept chair” avoids the problem.

- Organization test: What does the organization’s ethics officer or legal counsel say about this?
  Options: i. and ii. strong, iii and iv. weak, v. avoids the problem.

Make a choice based on steps 1 – 5

Employ both strong options

i. Get teaching training.
ii. Get a mentor.

Review steps 1 – 6

What could you do to make it less likely that you would have to make such a decision again?

Get teaching experience while doing graduate work - Learn about what she wants to do as an engineer

Are there any precautions you can take as an individual (e.g., announce your policy on the question, change jobs, etc.)?

Require her graduate students to get teaching experience.

The Bottom Line

- For Engineers:
  Recognize ethical problems and deal with them
  We all experience ethical problems…
  Personal and Professional

  “Credibility is hard won and easily lost”