Chapter (1)
Ethics and Professionalism

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Course Learning Outcomes

1) Identify ethical and professional issues pertaining to personal integrity, and professional conduct pertaining to the society and the environment [f].
2) Identify professional and ethical responsibilities and ethical relations to design processes [f, j].

Contents

Morality and Ethics

- Concerns the goodness of voluntary human conduct that affects the self or other living things
- Morality (Latin *mores*) usually refers to any aspect of human action
- Ethics (Greek *ethos*) commonly refers only to professional behavior

Ethics Vocabulary

Morals

Virtue

Integrity

Responsibility

Obligation

Professionalism

Honesty

Courage

Self-Respect

Accountability

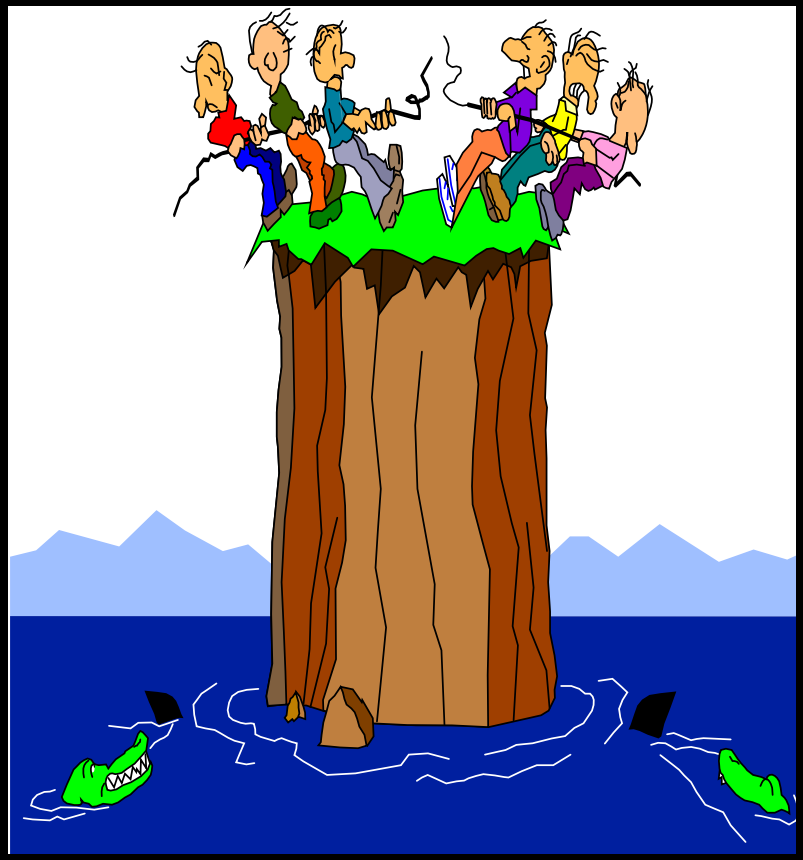
Character

Ideals

Ethics

Why study ethics?

- It is *important* for contributing to safe and useful technological product and to engineers' endeavor.
- It is *complex* that call for serious reflection throughout a profession.
- To responsibly confront moral issues raised by technological activity and to recognize and resolve *moral dilemmas*.
- To achieve *moral autonomy*.

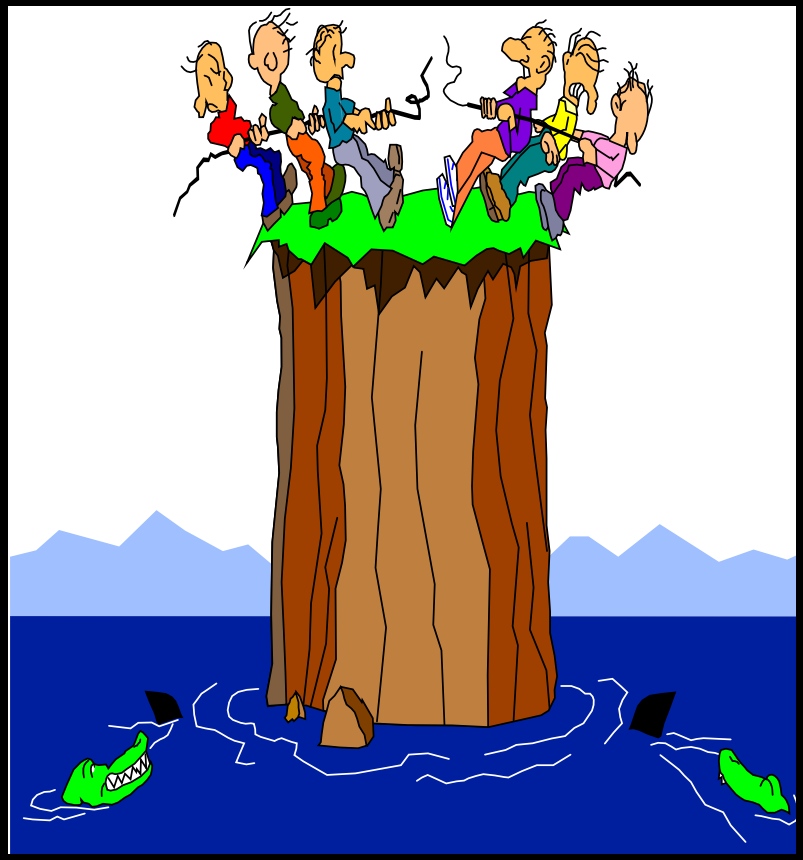


Ethical Issues are Seldom Black and White

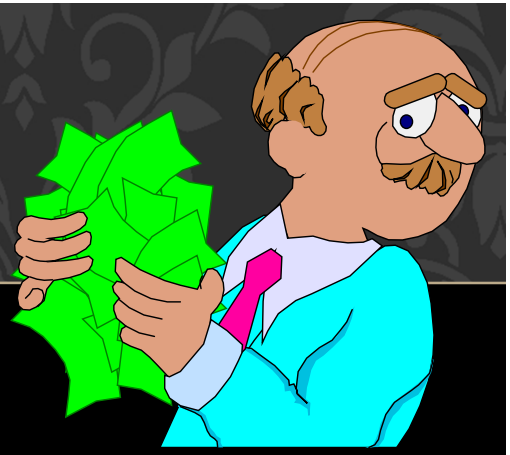
Conflicting demands:

- Loyalty to company and colleagues
- Concern for public welfare
- Personal gain, ambition

Ethical standards are usually relative and personal, there is seldom an absolute standard



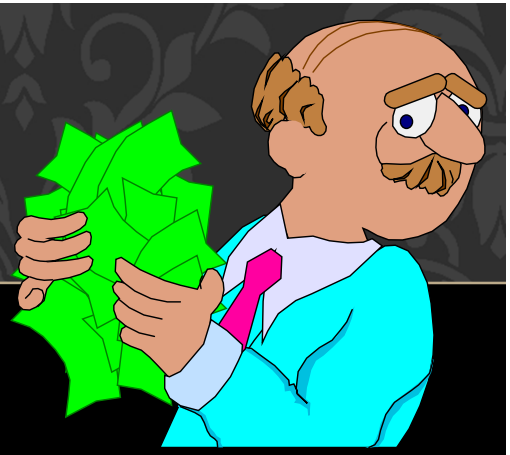
Moral or Ethical Dilemmas



- Situations in which two or more moral obligations, duties, rights, or ideals come into conflict.

- Situations in which moral reasons come into conflicts, or in which the application of moral values is problematic, and it is not immediately obvious what should be done.

Moral or Ethical Dilemmas



- To resolve we must Identify (Steps to solve Ethical Dilemma):
  1) The Ethical Dilemma (Moral Clarity)
  2) The factors (participants)
  3) Gather facts
  4) rank moral considerations (Conceptual clarity and Moral frameworks)
  5) consider alternative courses of actions
  6) arrive at a well-reasoned judgment.

Moral Autonomy

- Autonomous individuals think for themselves and do not assume that customs are always right.
- They seek to reason and live by general principles.
- Their motivation is to do what is morally reasonable for its own sake, maintaining integrity, self-respect, and respect for others.

An example of Moral Autonomy

"One who breaks an unjust law must do so openly, lovingly, and with a willingness to accept the penalty. I submit that an individual who breaks a law that conscience tells him is unjust and willingly accepts the penalty… is in reality expressing the highest respect for the law."

Rev. Martin Luther King, Jr. in **Letter from a Birmingham Jail**, 1963.

Practical skills that produce **Autonomous Individual**

1. Moral Awareness
2. Cogent moral reasoning
3. Moral coherence
4. Moral imagination
5. Moral communication
6. Moral reasonableness
7. Respect of person
8. Tolerance of diversity
9. Moral hope
10. Integrity

Responsibility

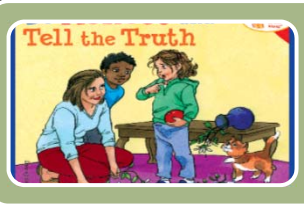
Moral

Causal

Job

Legal

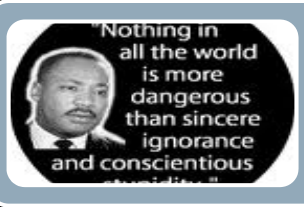
Moral Responsibility



Obligation

Incumbent and role responsibility

Accountable



Conscientious, Integrity (virtue)

Blameworthy/Praiseworthy

Moral Responsibility - Obligations

Types of actions that are morally mandatory. Some are:

a) Incumbent on each of us. (e.g. to be honest, fair and decent).
b) Role responsibilities such are parents, employees, or professionals. (e.g. safety engineering making regular inspection)

Moral Responsibility - Accountable

- Means being responsible.
- Means having the general capacities for moral agency, including the capacities for moral agency, including the capacity to understand and act on moral reasons.
- Means being answerable for meeting particular obligations.
- Example: being careful engineer

Moral Responsibility - Conscientious

Morally admirable engineer who accept their obligations and are conscience in meeting them.

Moral Responsibility - Blameworthy/Praiseworthy

When it is clear the responsibility of wrongdoing becomes synonym for blameworthy or responsibility of right conduct is synonym for praiseworthy.

What is a profession?

Advanced expertise

Possesses specialized knowledge and skills

Self-regulation

Belongs to and abides by the standards of a society

Public good

Serves an important aspect of the public good

What is a professional engineer?

- Has a bachelor's degree in engineering from an accredited school
- Performs engineering work
- Is a registered Professional Engineer (P.E.)
- Acts in a morally responsible way while practicing engineering

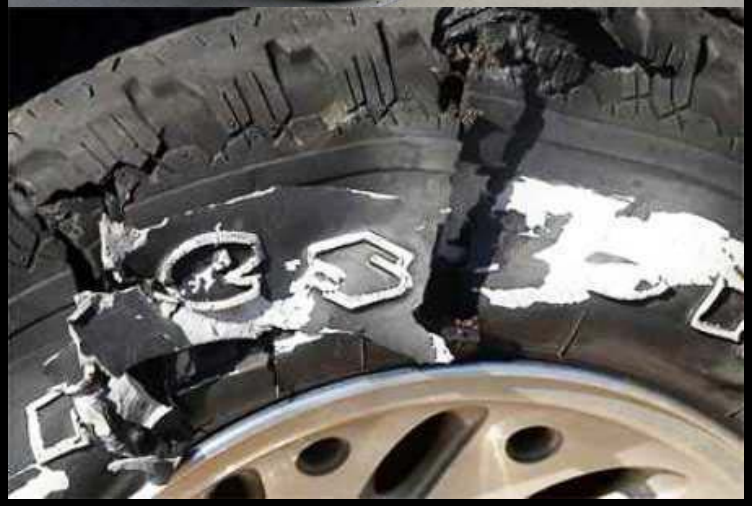
Other definitions

- Must be independent
- Must serve employer
- Must satisfy two general criteria:
  1. Attain high standards of achievement in education, job performance, and creativity.
  2. Accept moral responsibilities to the public, their employers, clients, colleagues, and subordinates.

Macro vs. Micro Ethical Engineering Issue

Micro Ethical Issues:
Concern the decision made by individuals and companies.

Macro Ethical Issues:
Concern the general direction of a technology development and collective responsibilities of engineers, engineering professional societies, and industrial association.



Quiz

Which of the following is NOT a characteristic of a profession?

- A) Specialized knowledge
- B) Responsibility to the public
- C) Self-regulation
- ✓ D) High salary

Quiz

Which of the following is an actual conflict of interest?

- A) Serving on a codes-and-standards committee for your own industry sector
- B) Voting in a public election on an environmental issue that directly affects your business
- ✓ C) Developing a site plan for a highway construction project in your own home community
- D) Accepting a coffee mug with one of your suppliers' business logo

Quiz

A requirement for maintaining competence to practice engineering is that you...

- A) maintain membership in a professional engineering society.
- B) take a continuing education course for credit at least once every two years.
- C) read the monthly magazine for your engineering discipline.
- ✓ D) maintain current knowledge of your discipline.

Quiz

The principles for ethical practice of engineering require the protection of all of the following EXCEPT ... ..

- A) health of the public
- B) safety of the public
- C) welfare of the public
- ✓ D) local and global environment

Quiz

You are a registered engineer working for a large design and construction firm. You would like to be more independent, so you decide to practice your entrepreneurial spirit by taking on very small design contracts on your own, working evenings and weekends to meet the contracts. You do not inform your supervisor of your activity, but your firm would not consider bidding on these small contracts as they would be more bother than they are worth. Is this a conflict of interest situation?

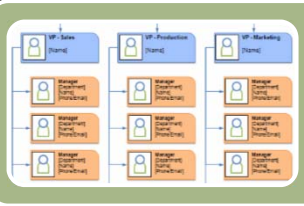
- ✓ A) Yes
- B) No

Quiz

Which one of the following forms of advertising is ethical?

- A) Run a full-page ad in the Yellow Pages claiming you are a "Jack-of-All-Trades" Engineer.
- B) Print and distribute wall calendars to clients and potential clients with pictures of major achievements of engineering, such as the space shuttle, Hoover Dam, and Brooklyn Bridge, including the name, address, and phone number of your company printed at the bottom of each page.
- ✓ C) Print and distribute wall calendars to clients and potential clients with the name, address and phone number of your company printed at the bottom of each page.
- D) Run an ad in the Yellow Pages stating your engineering services are the cheapest yet the best.

Sense of Corporate Responsibility



Responsibility & Obligation

Company policy's and assignment flowchart which differ from legal frame work

Accountable

Corporate are accountable to the general public, their employees, customer and stakeholders

Conscientious, Integrity (virtue)

When routinely meet their obligations

Blameworthy/Praiseworthy

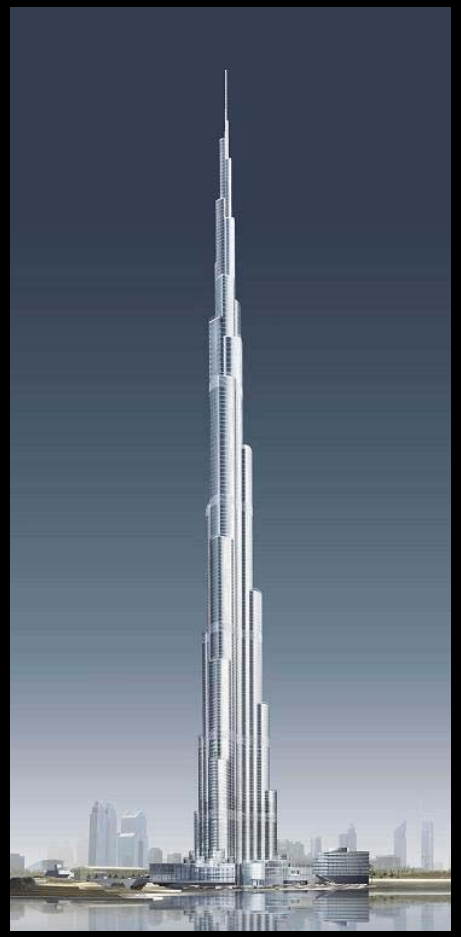
Dimension of Engineering

Dimensions of Engineering . . .

The idea of a new product is first captured in a conceptual design, which will lead to establishing performance specifications and conducting a preliminary analysis based on the functional relationships among design variables. These activities lead to a more detailed analysis, possibly assisted by computer simulations and physical models or prototypes. The end product of the design task will be detailed specifications and shop drawings for all components.

Manufacturing is the next major task. It involves scheduling and carrying out the tasks of purchasing materials and components, fabricating parts and subassemblies, and finally assembling and performance-testing the product.

Selling comes next, or delivery if the product is the result of a prior contract. Thereafter, either the manufacturer's or the customer's engineers perform installation, personnel training, maintenance, repair, and ultimately recycling or disposal.



Dimension of Engineering

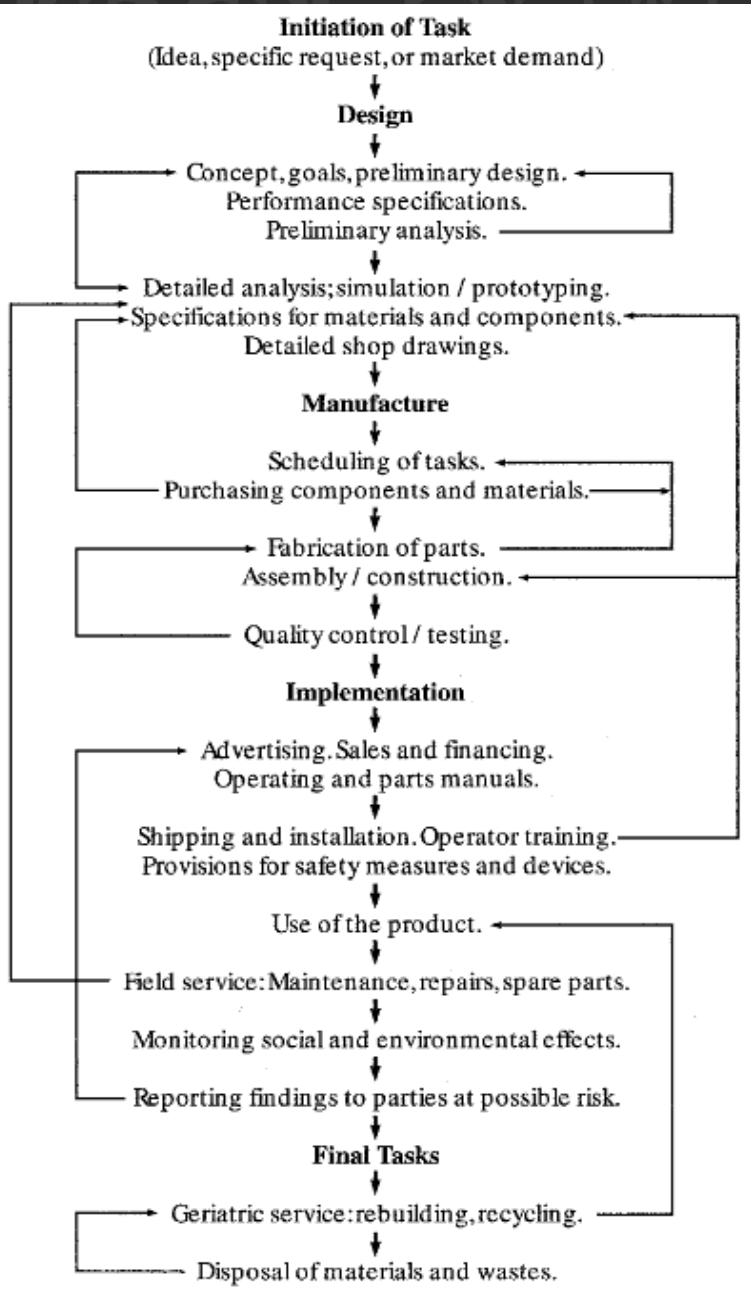


Figure 1–2
Progression of engineering tasks (⟶ ideal progression, — typical iterations)

Dimension of Engineering

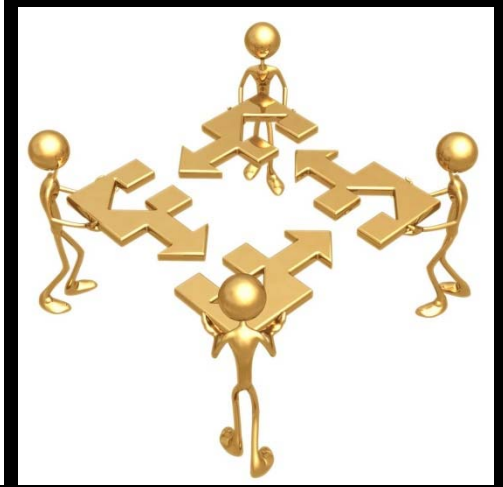
Table 1–1 Engineering tasks and possible problems

Tasks	A selection of possible problems
Conceptual design	Blind to new concepts. Violation of patents or trade secrets. Product to be used illegally.
Goals; performance specifications	Unrealistic assumptions. Design depends on unavailable or untested materials.
Preliminary analysis	Uneven: Overly detailed in designer's area of expertise, marginal elsewhere.
Detailed analysis	Uncritical use of handbook data and computer programs based on unidentified methodologies.
Simulation, prototyping	Testing of prototype done only under most favorable conditions or not completed.
Design specifications	Too tight for adjustments during manufacture and use. Design changes not carefully checked.
Scheduling of tasks	Promise of unrealistic completion date based on insufficient allowance for unexpected events.
Purchasing	Specifications written to favor one vendor. Bribes, kickbacks. Inadequate testing of purchased parts.
Fabrication of parts	Variable quality of materials and workmanship. Bogus materials and components not detected.

Potential Engineering Moral causes

The grab bag of problems in Table 1–1 can arise from shortcomings on the part of engineers, their supervisors, vendors, or the operators of the product. The underlying causes can have different forms:

1. *Lack of vision*, which in the form of tunnel vision biased toward traditional pursuits overlooks suitable alternatives, and in the form of groupthink promotes acceptance at the expense of critical thinking.[7]
2. *Incompetence* among engineers carrying out technical tasks.
3. *Lack of time* or *lack of proper materials*, both ascribable to poor management.
4. A *silo mentality* that keeps information compartmentalized rather than shared across different departments.
5. The notion that there are safety engineers *somewhere down the line* to catch potential problems.
6. *Improper use or disposal of the product* by an unwary owner or user.
7. *Dishonesty* in any activity shown in Figure 1–2 and pressure by management to take shortcuts.
8. *Inattention* to how the product is performing after it is sold and when in use.



Ethics, Morals, and the Law

Morals

Principles of right and wrong

Ethics

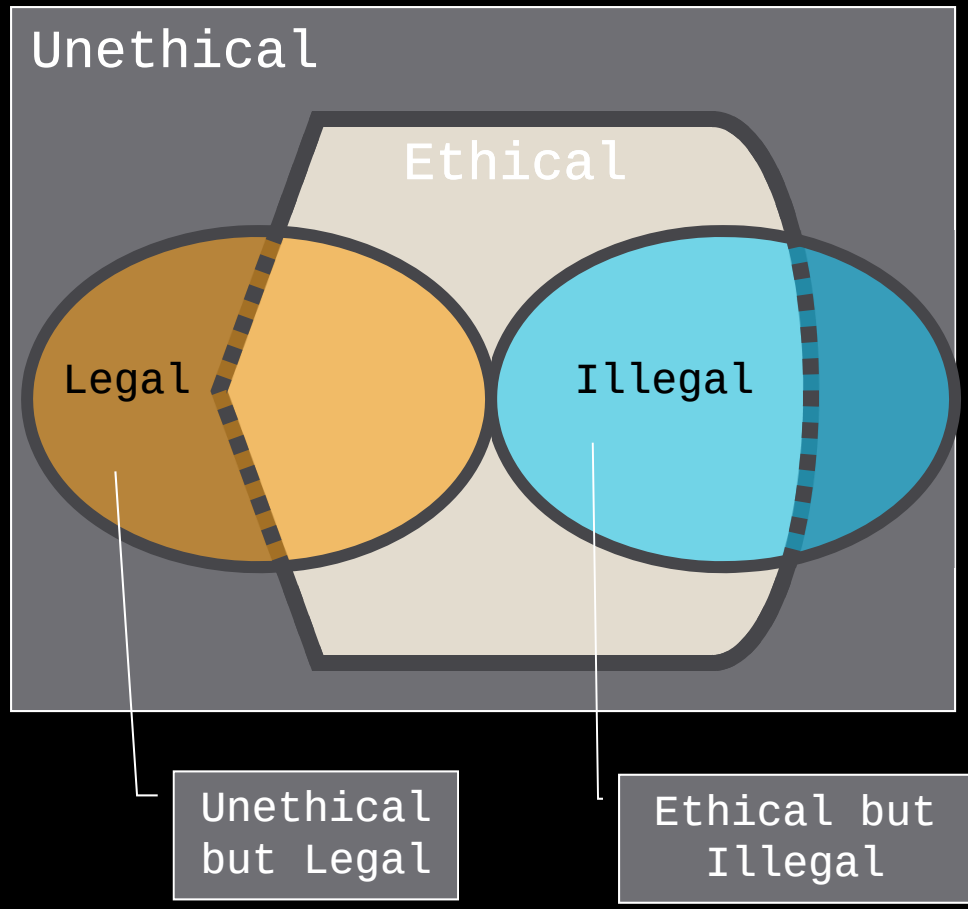
A set of moral principles guiding behavior and action

Laws

Binding codes of conduct; formally recognized and enforced

Company Policies

Classification of Actions:



CASE STUDY

Saving Citycorp Tower

Links

- Why Ethics? (Online lecture video)
- Online Ethics Center (OEC) (Online Resources)

Announcement

Quiz #1: one week from today.

The quiz is online using blackboard, so bring your computer/iPad.

One paper hand written is allowed (no copying).

Quiz time 25 minutes only.

Conclusions

- Engineering is our profession, not just a job.
- Study of engineering ethics can guide us in resolving the moral dilemmas we might encounter.
- Being responsible is what a professional is all about.
- Our goal must be to become morally autonomous in the performance of our duties.

Backup

You have met the standard for "competence" to undertake a public works engineering project only if

- A) you hold an appropriate professional engineering license in that discipline.
- B) the project outcome will protect the safety, health, and welfare of the public.
- C) you hold a degree in that engineering discipline.
- D) you follow appropriate codes and specifications.

You are a registered engineer working for a large design and construction firm. You would like to be more independent, so you decide to practice your entrepreneurial spirit by taking on very small design contracts on your own, working evenings and weekends to meet the contracts. You do not inform your supervisor of your activity, but your firm would not consider bidding on these small contracts as they would be more bother than they are worth. Is this a conflict of interest situation?

Which Canon or Canons apply in this situation?

- A) Canon 2
- B) Canon 3
- ✓ C) Canon 4
- D) Canon 5
- E) All of the above

Consider further the scenario in question 7. If you inform you current supervisor of what you would like to do and keep him or her informed of your contracts, are you in conflict of interest situation?

- [x] A) Yes
- [ ] B) No

You are working on the toll plaza construction phase of the Grand Harbor Tunnel project. You notice that the concrete being poured by Acme Construction for the tunnel roadway seems thin. Because of your previous work in a cement factory, your curiosity causes you to look more closely at the wet concrete. Your practiced eye tells you that the concrete has too much cheap aggregate and sand in it, and not enough cement. Under the ASME code, your proper course of action is:

- A) Do nothing --- it's not part of your job.
- ✓ B) Bring your concerns to your supervisor.
- C) Report your concerns to the local newspaper.

You are presenting the experimental work of a multidisciplinary biomedical research team at an engineering conference. One of your colleagues, Jim, has just completed mathematical modeling of the experimental data two days prior to the presentation and has agreed to let you use the results. Jim's name is not on the paper because the abstract and paper were completed two months prior to the conference. What is the most appropriate way to recognize his contribution?

A) There is no need to recognize Jim's contribution because the abstract and paper were completed two months prior to the conference.

B) There is no need to recognize Jim's contribution because he has agreed to let you use his work.

C) Mention in your talk that the mathematical modeling was carried out by Jim.

D) Add the statement "mathematical modeling by Jim" in the slide.

You serve on the board of XYZ Construction Company, which is planning a development in your town. The development has attracted criticism from citizens who called a meeting to organize opposition. You attended the meeting and spoke in favor of the development. Which one of the following options is most consistent with professional ethical principles?

- A) Speak in favor of the development without identifying your affiliation with XYZ, because your support is based solely on the merit of the project.
- B) Speak in favor of the development without identifying your affiliation with XYZ, because you have as much right as anyone in your town to voice your opinion.
- C) Speak in favor of the development and preface your statement by identifying yourself as an engineer whose opinion is supported by engineering analysis, but without identifying your affiliation with XYZ.
- ✓ D) Speak in favor of the development and preface your statement by identifying your affiliation with XYZ, also stating you are exercising your right as a citizen.

You are the chief engineer for Boiler Drum Company and have specialized in the design and construction of high pressure steam drums. As a result, you were invited to join the industry's Boiler and Drum Design Code committee. With the advent of higher pressure steam plants, the industry saw a need to revise the Boiler and Drum Code to accommodate the new, high pressure units and you (and the committee) have been working for about 2 years revising the code. Due to increased knowledge of the high temperature strength behavior of new steel alloys, the new code will allow high pressure steam drums to have thinner walls than under the previous code. Your company, Boiler Drum Company, is preparing a bid for several of these new steam drums for a new power plant. With your knowledge of the revised code, you could bid the drums less expensively than before. Your proper behavior is:

- A) Design and cost the drums using the old code.
- B) Design and cost the drums using the expected new code without appropriate references or clearly stating design bias.
- C) Design and cost the drums using the expected new code but indicate that the design is based on the proposed code.