

ETHICS IN ENGINEERING

- Why should I, as an engineer, be ethical?
- How should I, as an engineer, be ethical?
- What should I do, as an engineer, if I find myself in a situation where someone has been unethical? (Yes, it can happen to you.)
- How can I make real-world ethical decisions?

What is Ethical Behavior?

Following a code of personal behavior, such as:

- “Do unto others as you would have them do unto you” [The Golden Rule][Christianity]
- “Do the right thing” [a Spike Lee movie]
- Geneva Convention [warfare between nations]
- Honor Code [U-M College of Engineering]

Why Should I Be Ethical?

- “Do unto others *before* they do unto you”?
- Will pay off once (the first time you do it).
- But what about future dealings with others?
- You will lose benefits that accrue from ethical behavior: trust; information; data.

But I’m an Engin 100 Student! **Why Should I Be Ethical?**

You have teammates. If you are unethical,

- *How* can they trust you? *Why* should they?

You have classmates, in addition to teammates.

- Some will be classmates in future courses.
- Others will be co-workers in future jobs.

You have professors and teaching assistants.

- How can we be sure your work is your own?

How Should I Be Ethical?

As a U-M Engineering Student: [1/3]

- Follow the Engineering College Honor Code.
- <http://ossa.engin.umich.edu/honor-council/>
- When you take an exam in any CoE course, you will sign the Honor Pledge: “I have neither given nor received aid on this exam, nor have I concealed any violation of the Honor Code.”

How Should I Be Ethical?

As a U-M Engineering Student: [2/3]

“I have neither given nor received aid on this exam, nor have I concealed any violation of the Honor Code.” What does this imply?

- No other student has helped me.
- I haven’t helped any other student.
- I haven’t witnessed anyone else doing these.
- You **must** rat out anyone else who cheats!

How Should I Be Ethical?

As a U-M Engineering Student: [3/3]

- By signing this pledge, you are committed to following it. Legally giving your word.
- When I was a student, I wasn't required to rat out other students I witnessed cheating. But I signed the then-pledge, just like you.
- What if you do witness someone cheating? Report to: Lindsay Coleman, Suite 273, CC, 647-6955, colemani@engin.umich.edu. See
- <http://ossa.engin.umich.edu/honor-council/>

How Should I Be Ethical?

As a U-M CoE Professor: [1/2]

- Each year, as part of our Faculty Activity Report, we have to fill out and sign a form that discloses any situations in which a conflict of interest could arise from any consulting work we engaged in that year.
- Next slide for one of my forms, from 2007.
- CoE very serious about these. [Italics mine.]

Industrial Involvement Certification For the Faculty Activity Report covering 1/1/07 – 12/31/07

University of Michigan College of Engineering

Name: Andrew E. Yagle Department: EECS

The following information is requested in order to help the University manage *conflicts of interest*, and is held in strict confidence. In addition to this *disclosure* to the administration, you should *disclose* to your colleagues and students who could potentially be affected, existing or potential financial or other interests that might appear to impair the independence of your professional judgement. The objectives of *conflict of interest* management are to reduce the risks of compromising or appearing to compromise the integrity of scientific results, our obligations to students and colleagues, and the impartiality of the University's purchasing and other contractual relationships.

The University encourages faculty involvement in outside activities which enhance the faculty member's teaching and scholarship or promote technology transfer. *Disclosure* of outside relationships is the foundation of *conflict of interest* management, which protects the faculty member from the appearance of misconduct, as well as protecting students, outside entities and the University. In addition to this disclosure, faculty are required to *disclose conflicts of interest* on the Proposal Approval Form (PAF) and to the Technology Transfer Office as appropriate; stricter thresholds are used in those disclosures.

A. Please list any companies reasonably related to your professional duties in which you, your spouse or your dependents own more than 5% of the stock, or which might otherwise represent a conflict of interest issue.

None

B. List also any companies for which you or your spouse serve as an officer, or as a member of the board of directors or scientific advisory board.

None

How Should I Be Ethical?

As a Professional Engineer: [1/6]

- Follow the Code of Ethics for your field.
- Each field has its own Code of Ethics. Check web site for professional society, e.g., IEEE, SAE, SNAME, ASME, AIChE, etc.
- For the IEEE (Institute of Electrical and Electronics Engineers), the Code of Ethics is the 10 principles on the *next 5 slides*.
- Similar Codes of Ethics for other societies.

How Should I Be Ethical?

As a Professional Engineer: [2/6]

- To accept responsibility in making engineering decisions consistent with the safety, health, and welfare of the public, and to *disclose* promptly factors that might endanger the public or the environment.
- To avoid real or perceived *conflicts of interest* whenever possible, and to *disclose* them to affected parties when they exist. [Italics mine throughout]

How Should I Be Ethical?

As a Professional Engineer: [3/6]

- To be honest and realistic in stating claims or estimates based on available data.
- To reject bribery in all its forms.
- To improve the understanding of technology, its appropriate application, and potential consequences.

How Should I Be Ethical?

As a Professional Engineer: [4/6]

To maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full *disclosure* of pertinent limitations.

- [Translation: If you don't know how to do a task, something, make sure you tell this to your boss! Let the boss decide whether you can do the task.]

How Should I Be Ethical?

As a Professional Engineer: [5/6]

- To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others. [Don't plagiarize!]
- To treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin.

How Should I Be Ethical?

As a Professional Engineer: [6/6]

- To avoid injuring others, their property, reputation, or employment by false or malicious action.
- To assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Phrases showing up repeatedly

- *Disclose*: If there might be an ethical issue, inform your boss. Then it's his/her problem.
- *Conflict of interest*: If there might be an ethical issue, inform your boss.

Example: Ethical Problem #1

You know of a design flaw in your company's product. Your boss will do nothing about it, when informed of it.

According to the IEEE Code of Ethics, which of the following is your appropriate ethical course of action:

- (a) Do nothing on your own-your boss will handle it-that is part of his/her job.
- (b) Inform the IEEE about it and ask them to supply an *amicus curiae* ("Friend of the Court" legal brief).
- (c) Follow the your organization's grievance procedure.

Example: Ethical Solution #1

You know of a design flaw in your company's product. Your boss will do nothing about it, when informed of it.

According to the IEEE Code of Ethics, which of the following is your appropriate ethical course of action:

- (c) Follow the your organization's grievance procedure. [slide [2/6]]

Example: Ethical Problem #2

- You are asked by your boss to perform a task. The problem is, you don't know how to do it!
According to the IEEE Code of Ethics, which of the following is your appropriate course of action:
- (a) Tell your boss you'll do it, and then learn how to do it on your own time.
- (b) Say you'll do it, find someone who does know how to do it, and hire them yourself to do it.
- (c) Admit to your boss you don't know how to perform the task.

Example: Ethical Solution #2

- You are asked by your boss to perform a task. The problem is, you don't know how to do it!
According to the IEEE Code of Ethics, which of the following is your appropriate course of action:
- (c) Admit to your boss you don't know how to perform the task. [Slide [4/6]]

Example: Ethical Problem #3

You are a professor who has written a textbook.
You wish to use it in the course you are teaching.
Should you inform your department chair?

- (a) No-they have other things to worry about.
- (b) No-I don't get paid enough, so why not earn some more money from the students?
- (c) Yes-this is a conflict of interest, so I should disclose this to my boss.

Example: Ethical Solution #3

You are a professor who has written a textbook.
You wish to use it in the course you are teaching.
Should you inform your department chair?

- (c) Yes-this is a conflict of interest, so I should disclose this to my boss. In practice, they will be OK with this. Note (a) and (b) are true, but incorrect.

Example: Ethical Problem #4

- When taking the Engin 100 midterm, you notice one of your teammates peering at someone else's exam paper. From the Honor Code, what should you do?
- (a) Nothing-it's none of your business.
- (b) Nothing-don't rat out one of your teammates.
- (c) See <http://ossa.engin.umich.edu/honor-council/>

Example: Ethical Solution #4

- When taking the Engin 100 midterm, you notice one of your teammates peering at someone else's exam paper. From the Honor Code, what should you do?
- (c) See <http://ossa.engin.umich.edu/honor-council/>

More of these in Discussion this week

- Above questions are from past midterm exams.
- Yes, **ethics will be on the midterm exam!**
- Ethics is an important part of Engineering 100, since it is an important part of being an engineer.

What Do I Do If I Have a Problem?

- **As a U-M student:** Follow the Honor Code Procedure (see honor.engin.umich.edu)
- **As a practicing engineer:** Follow the grievance procedure for your company. (They have one-guaranteed!)
- **If still not resolved to your satisfaction:** Go to your professional society. For IEEE:

From an IEEE Presentation: Situations Where IEEE Can Help:

- Member-member disputes over behavior. NOT employer-employee disputes (they say).
- Public safety; conflict of interest; practice outside area of expertise; whistleblowing.
- Disclosure of potential hazards and conflicts of interests; Discrimination in workplace.
- Cannot engage in “fishing expeditions.” IEEE must rely entirely on its members to bring any ethical violations to its attention.

From an IEEE Presentation: IEEE Help: What It Does

- Ethics & Member Conduct Committee: Advises the Board of Directors on Ethics. Can also give Amicus Curiae (“Friend of the Court”) briefs on standard engineering practice in legal cases.
- If one member accuses another of unethical: Perform preliminary investigation. If prima facie evidence of wrongdoing, form hearing board. Recommendation goes to Board of Directors.

From an IEEE Presentation: Whistleblowing:

- Whistleblowing should be used as a last resort after all formal procedure have been exhausted.
- If the evidence is compelling that the public or end-users are put in danger because of faulty engineering, IEEE can offer help in ensuring that there is factually correct basis for the action.
- For example, IEEE can file an *amicus curiae* brief to inform the court about best engineering practice.

Bottom Line of Ethical Practice

- Professional Integrity Requires:
- Limiting practice to areas consistent with one’s training and experience.
- Assessing one’s abilities realistically.
- Giving due credit to the work of others.
- Diligent searching of technical literature to establish the prior art.
- Avoiding plagiarism.
- *Disclosure* of any conflicts or limitations.