Ethics, ECE 445/ME 470, and You

Ethics, Morals, and Laws

- *Morals* stem from an individual's view of a situation. They are "personal beliefs and values that inform the many decisions that a person makes from day-to-day" (*Purtillo, 2005*; *Makela, 2009*).

- *Laws* are "the rules of conduct set forth by a controlling authority to facilitate harmonious living among groups of people" (*Makela, 2009*). Laws set a *minimum* standard of behavior.

- *Ethics* "involves systematic judgments of value regarding 'how people ought to act toward one another' as members of a particular societal group" (*Kitchener, 2000; Makela 2009*).

Ethics, Morals, and Laws

- Individual vs. collective standards
  - I feel *morally* bound to volunteer in my community.
  - I am *ethically* bound to properly credit others.

- Ethics vs. Morals vs. Law
  - Is it unethical or immoral to travel 60-mph in a 55-mph stretch of highway?
  - How about if you are rushing someone to a hospital?
  - How about if you are in a 30-mph school zone?

- Ethics is group and context dependent
  - A medical doctor has an ethical obligation to provide care in an emergency.
  - An engineer has an ethical obligation to acknowledge and correct errors in technical analysis.

The power of ethics

- External reference for ambiguous situations

- Fosters a healthy, productive work environment

- Protects employees who take a stand

- Promotes a "fair" working environment
  - In this course
  - In your career
  - In your life

Your behavior reflects back on the discipline

Ethical engineering

- IEEE Code of Ethics and ACM Code of Ethics
  - Be aware of the effect of your work and the products you build
  - Make honest claims about your work and the safety of the products you design
- Read the code of ethics and make note of how it applies to your project
  - Discuss ethics in your Proposal, Design Review, and Final Report

Ethics codes are **not** a replacement for human judgement

Ethics Considerations for ECE 445/ME 470 Students

- ZJUI-UIUC trained engineers are among the best and most highly sought after in the world.

- As such, our engineers must be trusted to conduct themselves according to the highest ethical standards.

- All teams must address ethical considerations in their projects.

- **First**, there are the Codes of Ethics published by professional societies, such as IEEE and ACM.
  - these Codes of Ethics
    - o provide guidance to engineers in decision making
    - o lend the weight of the collective community of engineers to individuals taking a stand on ethical issues.
  - All teams must read the IEEE code and ACM code and comment on any sections of the code that bear directly on the project.

Ethics Considerations for ECE 445/ME 470 Students

- **Second**, we expect our students to have personal standards of conduct consistent with the IEEE and ACM Codes of Ethics, but also beyond it.

- That is, there are areas of ethics not addressed by these Codes that the engineer may consider in taking on projects or jobs. These are personal standards and choices. In the context of the class, there are no right or wrong answers here.

- Our students simply need to demonstrate that they are thinking deeply about their own decisions and the consequences of those decisions.

- We encourage our students to consider the wider impact of their projects and address any concerns raised by potential uses of the project.

Potential Ethics Problem Areas for ECE 445/ME 470 Students

- Plagiarism
  - Students are encouraged to make use all available resources relevant to their project
  - However, all use of previous work must be acknowledged and referenced
- Do not tolerate unethical behavior by fellow students
  - If one member of a team is found guilty of plagiarism, the entire team fails
  - Make sure team members understand each other's work
- Evidence of possible plagiarism may trigger a formal investigation with long-term consequences

Honesty and record keeping

- Document ***EVERYTHING*** – even failures
  - **Lab notebooks!**
  - Protects your intellectual property
  - Written reports: proposal, design review, progress report, final report
  - Supports your conclusions and allows reproduction of results
  - (documentation does not end with graduation!)
- What not to do:
  - Forge data or throw out bad data points
  - Leave out important details of your test setup or changes to the procedure

Science and engineering are built on evidence

ILLINOIS

Stealing, cheating, and plagiarism

- There is a right way to utilize the work of others
  - Give credit where it is due
  - Fair use and copyright laws
  - Good scholarship requires citation of related work and precedents and provides a history of the evolution of an idea
- Don't pass off the work of others as your own
  - Reference circuits, open-source software, previous projects, peers, TAs, etc.
  - All project members must understand what work is referenced to others.
- Properly cite your work
  - IEEE style, please

Honesty

- Beware the line between promoting your work and distorting the facts

- There is a difference between rejecting bad data and committing lies of omission

- Don't fake data!

The danger of group-think

- Ethics codes are not a replacement for human judgment

- Ethics is not a static subject
  - New boundaries of possibility
  - Changing standards of acceptable risk

- Trivialization

Beyond ECE 445/ME 470

- Ethical choices show up everywhere
- There may be something to gain from making the ethical choice, even if it is not the easiest choice!

Relevant Resources:

- [IEEE Code of Ethics](#)
- [ACM Code of Ethics](#)
- [University of Illinois Student Code](#) (specifically sections in 1-302)
- [ECE 445 Ethical Guidelines](#)

> A professional reputation takes time and effort to build, but it takes one poor decision to ruin!

Final thoughts

- Would I be comfortable having my name widely attached to this project?

- Do I want to live in a society where this product is available or widely used?

- Would I be proud of a career dominated by the decision making demonstrated here?

The real test of your ethical standards will come when you can significantly benefit from unethical behavior and are confident you will not be caught.

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology, its appropriate application, and potential consequences;
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;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.
APPROVED BY IEEE BOARD of DIRECTORS, 2006   - From www.ieee.org