



Ethics in Electrical and Computer Engineering

Lecture #1: Introduction

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Electrical and Computer Engineering...

- What are you becoming when you become an ECE?
- ECEs defined by what they have done...
- Since 1884, when Electrical Engineering was first formed, what have ECEs done?
- How will you fit into the flow of **ECE history**? **Read the history!** (see **IEEE History Center publications**)
- What will *you* contribute?



ECE Impact



- **Direct impact:**

- Electric power generation and distribution
- Electric motors - consumer applications (washer, dryer)
- Radio, TV, stereos, CDs/DVDs, video games
- Telegraph, telephone, cellular
- Computers, microprocessor, software
- Cable car, automotive systems, electric car, aircraft avionics
- Medical monitoring devices, surgical lasers
- Military weapons, nuclear, communications



- **Indirect impact** via other areas of engineering and science is significant!

- **Broad Impact:** Democracy, education, development?



What is the Role of an Electrical or Computer Engineer in Modern Society?

- **Role models?**



- The role of role models: inspiration, guidance
- Others? Politicians, actors?
- You may say “Yes, I know some of the technicalities but what else is there to it?”
- “Is there anything beyond $V=IR$?”
- “If so, what is it?”

Electrical and Computer Engineering are Professions

“Profession”



- Job experience? Gives ideas...
- What does it mean to join a “profession”?
- **Profession:** A calling requiring *specialized knowledge* and often long and *intensive preparation* including instruction in skills and methods as well as in the scientific, historical, or scholarly principles underlying such skills and methods, maintaining by force of *organization* or concerted opinion *high standards of achievement and conduct*, and committing its members to *continued study* and to *a kind of work which has for its prime purpose the rendering of a public service*.



A Profession is
“the pursuit of a learned art
in the spirit of public service”
(ASCE)



Engineers Council for Professional Development: What one who practices a profession must do:

1. They must have a service motive, *sharing their advances in knowledge*, guarding their professional integrity and ideals, and rendering gratuitous public service in addition to that engaged by clients.
2. They must recognize their obligations to society and to other practitioners by living up to established and accepted codes of conduct.
3. They must assume relations of confidence and accept individual responsibility.
4. They should be members of professional groups and *they should carry their part of the responsibility of advancing professional knowledge, ideals, and practice*



Perceptions/realities of professionalism

- How do engineers rank in the public's perception of professionalism?
- In other countries?
- Relative to medical doctors? Lawyers?
- Who cares?
- How is the perception impacted by...
 - High-profile cases?
 - Direct impact to humans? (health and welfare)
 - “Pro bono” work?



What this course is about...

- You know *part* of the technical side...
- We will look at “conduct” and “public service” in the context of engineering
- An ABET-*required* part of your curriculum...

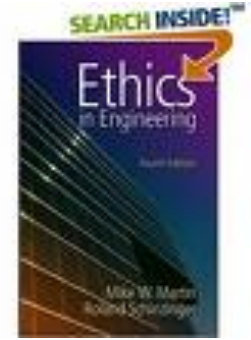
ABET: Engineers shall hold paramount the safety, health, and welfare of the public in performance of their professional duties.

Engineers shall seek to promote the “common good”

Engineering education development.... “service-learning” ... important/growing, and may change engineering education as it is changing many other areas in the university



Class textbook...



- Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, 4th Edition, McGraw-Hill, NY, 2005.
- Earlier editions cannot be used
- Buy it, keep it as part of your professional library
- **READ ALL OF IT *THIS SEMESTER***
- **Please, take a professional attitude toward learning in this class (keep up on reading without being told). Read Chapters 1-2 now**
- Lectures also based on Harris CE, Pritchard MS, Rabins MJ, James R, Englehardt E, *Engineering Ethics: Concepts and Cases*, Wadsworth, Boston, MA, 2014.



Themes of course...

1. **Design**, competence/excellence, safety/risk, global impacts, cautious optimism
2. **Moral autonomy**, responsibilities, rights, professional conduct, organizational impact
3. **Personal commitment and meaning**, moral leadership, gratuitous public service, promote common good



Study engineering ethics...

- To see **habits of professional behavior**
- **Moral autonomy:** moral... awareness, reasoning, coherence, imagination, communication, reasonableness, respect, tolerance, hope, integrity
- **Responsibility:** obligations, accountability, conscientious, blameworthy/praiseworthy



Study also “social justice” and engineering

- Social justice can be defined as standards for, and a view on how to promote via human interactions, human dignity and human fulfillment for all of humanity
 - Human rights
 - Fair treatment at work
 - Fair treatment in economics and politics
 - Environment and peace
 - Religious and secular perspectives
- These issues arise throughout the class



Study the “social responsibility movement,” relative to engineering professionalism

- Engineering companies strive to be “good neighbors” by supporting schools, cultural activities, civic groups, and charities
- Opposing/old? view: “The social responsibility of business is to increase its profits” (Friedman)
- Community-oriented view in engineering (Battelle, IEEE/UN HTC, OSU ECOS, etc.)
- Important part of engineering professionalism...
 - Use engineering skills? “Pro bono” services.
 - Time, *talent*, money...
 - “Service-learning” at OSU... It is fun!



Course syllabus, materials...

See web for all assignments/handouts (link at Carmen), and all homeworks and final project must be submitted electronically via Carmen

<http://www.ece.osu.edu/~passino/ee481.html>

- **Course details:**

- Attendance required (one excused absence allowed, but must email Prof. Passino, passino.1@osu.edu, for approval)
- Teaching assistant (attendance, grading)
- Homeworks (submit electronically via Carmen; grades are ✓+, ✓, ✓-, and X; will *not* accept substandard work, so must redo/resubmit if get an X)
- Final Project (teams of 2-4 persons required, assigned today-start now!, see web; collaboration only in group; submit via Carmen)



Role of Professionalism in ECE Education

- Education for a profession
 - Calculus, physics, chemistry, etc.
 - Circuits, signals and systems, electromagnetics, solid state, computers, control, signal processing, communications, etc.
- 1 cr. course on ethics and professionalism
 - “low priority course”?
 - “waste of time”?
 - “technical courses are much more important”?
 - “this is liberal arts type stuff so it is not important”?
- **Hopefully you will come to see its importance** (for some of you, well after graduation)... nontraditional students typically recognize/acknowledge the importance...



First Topic on Professionalism, Professional Behavior in Class...

- Think of this as being “on the job”
 - You like your job, you want to be promoted, you want a raise
 - You are concerned about how your colleagues view you
- View this as a **meeting** that you have to be at each week
 - Be on time, listen, do not do homework for other classes
 - **Get involved !**
- **DO NOT BE LATE.** It is quite unprofessional... do not sneak in!!! How would your colleagues view this? Your boss?
- **DO NOT CHEAT**
 - Don’ t cheat on attendance sheets
 - Homeworks: May discuss, but must turn in *all* your own work (e.g., no e-splitting of parts), on time
 - Final Project: Inter-teamwork only allowed
 - I will use the OSU Committee on Academic Misconduct, if needed



What do you want to discuss this semester?

- Must be an engineering ethics or engineering-relevant social justice topic
- Could be a current topic (e.g., in the news)
- Can you provide me with a concrete case that we can discuss in class (especially something you witnessed yourself)?
- You could provide me such information now (via email) or via later “attendance questions”



Attendance Question

- Name as many famous engineers as you can:
 - May or may not be alive today
 - Known by the *general public*
 - Can be fictitious
 - “Exemplars”?

Please: Put your name on the sheet of paper and turn it in...

