

Ethics in Engineering

Overview of Presentation

- **Fundamentals of Ethics**
- **Ethics Education in Engineering**
- **Codes of Ethic**

Accreditation Board for Engineering and Technology

Definitions of Ethics

- **The study of the general nature of morals and of the specific moral choices to be made by a person; moral philosophy.**
- **The rules or standards governing the conduct of a person or the members of a profession: *medical ethics*.**

Levels of Technology

- **Development and use of devices and techniques**
 - Software
 - Products
 - Gene-transfer vector
- **Effects that come in the wake of new devices and techniques**
 - Intensive care unit
 - Living will
 - Radioactive waste
- **Way of relating to the world**
 - Enhancement technologies
 - Objects for human manipulation
 - Rejection of given
 - Humanity exerts power
 - Humanity as creator, or created cocreator

Attitudes toward Technology

“Even using the yardstick of the ancient Greeks, our whole modern existence is nothing but *hubris* and godlessness....

Hubris today characterizes our whole attitude towards nature, our rape of nature with the help of machines and the completely unscrupulous inventiveness of technicians and engineers.”

Friedrich Nietzsche, On the Genealogy of Mortality, Cambridge Press, New York, 1994, 86.

What is “hubris?”

- A Casey Clausen press conference
- Detritus on the Outer Banks after a hurricane
- Exaggerated pride or self-confidence

Teaching engineering ethics . . . can achieve at least four desirable outcomes:

- a) increased ethical sensitivity;*
- b) increased knowledge of relevant standards of conduct;*
- c) improved ethical judgment; and*
- d) improved ethical will-power (that is, a greater ability to act ethically when one wants to).*

**Davis, M. “Teaching ethics across the engineering curriculum.”
Proceedings of International Conference on Ethics in
Engineering and Computer Science. Available online at:
<http://onlineethics.org/essays/education/davis.html>.**

Ethical responsibility...involves more than leading a decent, honest, truthful life. . . . And it involves something much more than making wise choices when such choices suddenly, unexpectedly present themselves. Our moral obligations must . . . include a willingness to engage others in the difficult work of defining the crucial choices that confront technological society

Langdon Winner, 1990. "Engineering ethics and political imagination."
Pp. 53-64 in *Broad and Narrow Interpretations of Philosophy of Technology: Philosophy and Technology 7*, edited by P. Durbin.
Boston: Kluwer. Cited in Joseph R. Herkert, "Continuing and Emerging Issues in Engineering Ethics Education," The Bridge, 32(3), 2002.

Professional Codes of Ethics

- **Accreditation Board for Engineering and Technology (ABET)**
- **National Society of Professional Engineers (NSPE)**
- **Institute of Electrical and Electronic Engineers (IEEE)**
- **American Society of Mechanical Engineers (ASME)**
- **Biomedical Engineering Society (BMES)**

ABET Code of Ethics of Engineers

The Fundamental Principles

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

I. using their knowledge and skill for the enhancement of **human welfare;**

II. being honest and impartial, and serving with fidelity **the public, their employers, and their clients;**

III. striving to increase the competence and prestige of the **engineering profession; and,**

IV. supporting the **professional and technical societies of their disciplines.**

Groups Who Benefit (ABET)

- **The human family**
- **Public**
- **Employers**
- **Clients**
- **Profession**
- **Professional and technical societies**

ABET Code of Ethics of Engineers

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.**
- 3. Engineers shall issue public statements only in an objective and truthful manner.**
- 4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.**
- 5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.**
- 6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the profession.**
- 7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.**

Ethics in ABET Program Outcomes

Engineering programs must demonstrate that their graduates have

- Ability to apply knowledge of mathematics, science, engineering
- Ability to design and conduct expts, analyze and interpret data
- Ability to design system, component, or process
- Ability to function on multidisciplinary teams
- Ability to identify, formulate, and solve engineering problems
- **An understanding of professional and ethical responsibility**
- Ability to communicate effectively
- **Broad education necessary to understand engineering impact in a global and societal context**
- Recognition of need for and ability to engage in life-long learning
- **Knowledge of contemporary issues**
- Ability to use techniques, skills and modern engineering tools necessary for engineering practice

Engineering Ethical Education Issues to be Considered

- **Ethical implications of public policy relevant to engineering:**
 - Sustainable development
 - Health care
 - Risk and product liability
 - Information technology
- **Culturally embedded engineering practice (institutional and political aspects of engineering, such as contracting, regulation, and technology transfer)**
- **Macroethical issues (e.g., overconsumption)**

Herkert, The Bridge, 32(3), 2002