Engineering Problem Solving ENG1001

Professionalism and Ethics in Engineering

Session Objectives

- Engineering Ethics
  - Professional Engineering
  - Code of Ethics
  - Ethics Case Study

Exam

- Date: _____ (replaces session 7b)
- Time: 6-7PM
- Location: _____
- Materials Needed:
  - Non-programmable calculator
  - Pencil
  - Eraser
  - M Number (MTU ID Number)
- Format: Long Answer and Multiple Choice
- Topics:
  - Communication & Engineering Profession
  - Teaming
  - Problem Solving Method
  - Units/Unit Conversions/Line-Mole Method
  - Spreadsheets (relative & absolute addressing, graphing, functions, etc)
  - Statistics (Basic & Quality Control)

Engineering Ethics

ENG1001 Objectives:

- Understand ethics and its importance to the engineering profession
- Explore ethical decisions in case studies
- Become aware of the non-technical issues in engineering decisions; i.e., what is the "right" thing to do
- Practice using professional guidelines (Codes of Ethics) in making decisions

Individually

- Define ethics.
- State the importance of ethics to engineering.

Ethics

- “consists of general and abstract concepts of right and wrong behavior culled from philosophy, theology, and professional societies” – Holtzapple (p. 527 of Eide)
- “guide to personal conduct of a professional” – Eide (p. 69)
- “set of behavioral standards that all engineers are expected to follow”

My Definition of Ethics

Morals are your personal standards for right and wrong.

- Come from:
  - family/friends
  - religion
  - media
  - school/work
- They are the “little voice in your head”
- **Ethics** guide how a “moral person” will behave
- **Professional ethics** are established to transcend local, cultural or moral beliefs

Why do Engineers need to know about Ethics?

With **Knowledge & Skills**, engineers have the power to do great things. With this power, engineers have a **tremendous responsibility** to clients, individuals and society. Ethics help guide our decisions to ensure we act **responsibly**.

Professionals

- Professionals are people who's job requires...
  - Specialized and comprehensive education
  - Strong desire to serve humanity
  - Examples: Doctors, lawyers, engineers
- Often registered with the state to protect the public
  - Doctors and lawyers must be registered
  - Engineers do not have to be registered

As a Team...

- Go to www.nspe.org

- Answer the following questions
  - What does NSPE stand for?
  - What is the purpose of this organization?
  - What are the steps to get your professional engineering license?

How to Become a Professional Engineer (PE)

- Exam question!
- Hint: Four-step process

Becoming a Professional Engineer (PE)

- Receive an engineering degree from an acceptable institution
- Pass the Fundamentals of Engineering (FE) exam
  - 8 hour exam
  - May take during last semester of school
- Complete four years of engineering practice
- Pass the Principles and Practice exam
  - 8 hour exam
  - Problems in your area of specialty

Engineering Education

- Should be “accredited”
  - Program meets standards and criteria for education
  - Quality control of programs
- Accreditation Board for Engineering and Technology (ABET)
  - Develop standards and criteria for the education of engineers
  - Programs reviewed at least every six years
  - Professional organizations represent the engineering profession
- MTU College of Engineering is ABET accredited

Reasons for Licensure

- An engineer MUST be licensed if...
  - Chief engineer at a firm
  - Expert engineering witness in court
  - Offers engineering consulting services
  - In a public employment position (usually)
- Although - Laws vary from state to state

- Other reasons for licensure
  - Jobs
  - Promotions
  - Money
  - Credibility
  - Respect
  - Security

The Professional Engineer has...

- Specialized knowledge and skills used for the benefit of humanity.
- Honesty and impartiality in engineering service.
- Constant interest in improving the profession.
- Support of professional and technical societies that represent the professional engineer.
- A professional engineering license

Professional Societies

- Purpose
  - Sharing of ideas
  - Promote excellence in the profession
  - Promote the profession itself
- Student chapters
  - Meet upperclassmen, faculty, engineers in industry
  - Conferences and competitions
  - Access to society publications
  - Mentoring
  - Scholarships

MTU Student Chapters of Professional Societies

- American Institute of Chemical Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- Associated General Contractors
- Audio Engineering Society
- Biomedical Engineering Society
- Douglass Houghton Chapter of Michigan Society of Professional Surveyors
- Institute of Electrical and Electronic Engineers
- I.E.E.E. Power Engineering Society
- American Indian Science and Engineering Society
- National Society of Black Engineers
- Nosotros/Society of Hispanic Professional Engineers
- Society of Automotive Engineers
- Society of Environmental Engineers
- Society of Women Engineers

www.sos.mtu.edu

Professional Engineering and Ethics

- Role of the professional engineer
  - Specialized knowledge and skills
  - Honest and impartial
  - Responsibility to clients, individuals and society
- Making ethical decisions
  - Code of Ethics
  - Experience of other professionals
  - Study ethics
- Remember – ALL engineers are expected to behave in a professional manner, whether or not you have your PE license.
- **ABET requires you know engineering ethics to earn your degree**

Code of Ethics

- Express the rights, duties, and obligations of the members of the profession
- Provides framework for arriving at good ethical choices
- Not comprehensive
- Who has them?
  - Professional Societies
  - Corporations
  - Universities
  - Government Institutions

As a Team...

- Look up the following professional societies' Code of Ethics

Team		
1, 6, 11, 16	– AIChE	www.aiche.org
2, 7, 12	– ASCE	www.asce.org
3, 8, 13	– ASME	www.asme.org/ethics
4, 9, 14	– IEEE	www.ieee.org
5, 10, 15	– SPE	www.spe.org

- Write down the 3 of the Code's fundamental principles and/or cannons.

The Ethical Engineer*

1. Protect the public safety, health, and welfare.
2. Perform duties only in areas of competence.
3. Be truthful and objective.
4. Behave in an honorable and dignified manner.
5. Continue learning to sharpen technical skills.
6. Provide honest hard work to employers or clients.
7. Inform proper authorities of harmful, dangerous, or illegal activities.
8. Be involved with civic and community affairs.
9. Protect the environment.
10. Do not accept bribes/gifts that would interfere with engineering judgment.
11. Protect confidential information of employer or client.
12. Avoid conflicts of interest.

*p.534 Eide/Holtzapple

Corporations

- Longer, more detailed codes to provide clear and specific guidelines (often called Company Policy) (Rules specific to company practices)
  - Business Practices
  - Relationships with suppliers & gov't agencies
  - Compliance with gov't regulations
  - Health and Safety
  - Environmental Protection
  - Equal employment
  - Affirmative Action
  - Sexual Harassment

Universities

- Guidelines for Students
  - Student Handbook
    - Policy on Discrimination and Harassment
    - Sexual Harassment
    - Drugs
    - Alcohol Policy and Procedures
    - MTU Computer Use Policy
    - Academic Integrity
    - Student Academic Grievances
    - Parking, Traffic, and Weapons Regulations
    - And more...
  - Students Rights and Responsibilities
- Similar guidelines for Faculty and Staff

Ethics Case Study

- Take notes!
- Write down any ethical issues that you observe.
- **Use either Incident at Morales or Twin Towers – Instructor Note**