ENGR4960J

Lecture 1

Definition of Ethics

Ethics is about actions that have the potential to seriously impact the lives of others.

Erhical Systems

Normative Ethics

> how people should act

- Utilitarian: the consequences of the action
    - suggest sacrificing one person to save many, aimes to maximize overall happiness
- Deontology: absolute principle that I should follow while deciding what to do
    - argue against sacrificing one person, emphasizing the importance of following moral rules
- Virtue ethics: what makes a better person
    - focus on the character of the decision-maker, encourage cultivating virtues like courage and compassion

Descriptive Ethics

> the way individuals actually act or rules that exist in a society

Lecture 2

Definition of Ethics

Ethics is about actions that have the potential t oseriously impact the lives of others

Ethics & Morality

- Difference:
    - Morality is more subjective;
    - Ethics more related to social conduct.
- In philosophy:
    - moral philosophy is more theoretical,

    - ethics is more related to praxes and actions.

Why Ethics in Engineering?

- Ethics should be relevant for everyone in society.
- Engineers create things that have an impact on other people.
- Ethics is needed if people want to live in community.

Ethics and Law

- Ethics might go against laws.
- Ethics is much more persuasive.
- Many laws take their roots in ethical believes.

Why for Engineers?

- Engineers have direct impact on society
- Engineers are different from the general public. They have specialized knowledge.
- Engineers act as a black box, so it is important society can “trust” engineers in acting ethically.
- Ethical obligations engineers have (as part of their profession).
- Engineers must become aware of these responsibilities and rights.

A Global Perspective

- include many stakeholders from different areas
- without global perspective it will be impossible to evaluate cases effectively
- How to: human reason, role responsibility, case study

Human Reason

- The ability to logically think through problems
- What defines human beings from other creatures
- Universal/Same across culture
- Without the ability to reason, engineering could not exist.

Role Responsibilities: Special Duties

- Duties associated with a particular position
- One person can have different “positions” and so many duties even conflictual

Case Studies

- Specific cases to avoid abstractions;
- Make the different values embedded in different cultures emerge;

Definition of the engineering

The transformation of the natural world, using scientific principles and mathematics, in order to achieve desired practical end.

5 Assumpstions

Assumption 1

> The nature of engineering and the world

- Engineering is not value neutral because their actions impact other people.
- What limits should be placed on engineering processes, and what justifies these limits?

Assumption 2

> The nature and use of the reason

- Use the reason as universal characteristic
- Reason is generally defined as the process of logical thought, being able to provide clear justifications for decisions.
- Engineers are supposed to use logic and scientific reasoning for their work.
- An engineering training should push you towards a rational way of thinking.

Assumption 3

> Human nature and economics

- Tendency to seek out their own gain
- but professionals should not just focus on this specific egoistic way of acting as part of a community
- This assumption does not mean, however, that human beings cannot or will not seek out the benefits of others, acting in an altruistic fashion.

Assumption 4

> Cultures and values

- Different cultures have different value systems.
- They have to be taken as alternative.
- One culture does not have more rights and it does not have more value
- Enriching the discourse with elements from different culture.

Assumption 5

> Ethics and religion

- Many societies have religions telling and structuring the values and how people should act in an ethical way
- Since we restrict the course to engineering, we will not focus on these elements.

Lecture 5

The history of engineering

- The word ‘engineer’ comes from French language and is closely related to the military context
- Around 400 years ago France was the first country to organize two types of corps that are military engineering and civil engineering
- The first engineering institute was the Ecole Polytechnique(1794). This institute provided a three year education.

Three ways of defining profession

Paradigm or ideal type

- The term "paradigm" in the context of defining a profession refers to an idealized model that embodies the essential characteristics and features of what is considered an exemplary profession.
- This framework represents the quintessential traits and standards associated with a particular profession.
- It serves as a reference point for understanding the core characteristics and evaluating other professions.

Central characteristics

> Essence of what it means to be a profession, most commonly located in the “service ideal” – the establishment of a profession, when the public recognizes that a specialized, highly skilled, and necessary activity can be performed the best if a small group is delegated as the sole provider of that service.

- Professionals have an exclusive right to perform a particular service
- Professionals are able to provide an autonomous judgment of the quality of the professional activity
- Professionals control of entrance requirements to the profession

By Prestige

- Begins with the actual circumstances of occupational groups, assuming occupational groups want the prestige and power associated with being a professional.
- Based on self interests, a group will take the steps necessary to achieve that title.
- Occupational groups will attempt to acquire whichever characteristics society demands from the group it refers to as a “profession”

Lecture 6

Contract Model

> Professions (professional organizations), Society, Professionals

- Professions (professional organizations) & Society

    - Professions to society: ensure service quality
    - Society to professions: exclusive service right

- Society & Professionals

    - Society to professionals: Opportunities, pay, and prestige
    - Professionals to society: Service and loyalty

- Professionals & Professions (professional organizations)

    - Professionals to professions: loyalty
    - Professions to professionals: regulate service behavior

Characteristics of profession

1. Specialized body of knowledge, based on theory
2. A set of skills that puts this knowledge into action – applied knowledge
3. Long period of formal education
4. Profession controls entry – educational and extra-educational requirements, interviews and exams
5. Profession controls individual – a way of punishing through penalties
6. A professional culture – norms and behavioral patterns
7. Individual autonomy and authority
8. Way of showing the service ideal is met
9. Professional organizations – disseminate knowledge and enhance the culture
10. Society accords prestige - good pay to the members of the profession

Profession, Society and Professionals

- Profession = intermediary between society and the individual professional
- Society “gives” to a profession an exclusive right to provide a service
- The profession is setting criteria and the codes to be followed

Engineering as a Profession

- Each profession has its mission
- Mission of engineering = designing and being responsible for the production of technological devices
- However, the professionalization of engineering has been a relatively recent phenomenon

Professional Organizations In relation to Professionals

- Exercise controls over its members, to insure the adequacy of work
- Professional associations, such as the ASME – responsible for the development of technical standards, behavioral norms, and licensing and educational requirements

Professional Organizations

> Engineering has no such central organization – lacks universal licensing requirements
> RATHER, different organizations administer the various functions of the profession.

- National Society of Professional Engineers (NSPE) – licensing procedures, although licenses are granted by individual states. In the US, less than twenty percent of practicing engineers are licensed, due to the “industrial exemption.”
- Technical organizations – responsible for the transmission of new knowledge and development of technical standards
- Accreditation Board for Engineering and Technology (ABET) - responsible for accrediting engineering and technology education programs at colleges and universities.

Engineering license

When an engineer is licensed, it means:

- that they have met specific professional requirements
- have been granted official permission by a recognized licensing authority to practice engineering
- This licensure is a formal recognition that the engineer has demonstrated the education, experience, and competence necessary to safeguard public safety

Requirements to be licensed

- Education: Licensed engineers typically have completed a formal education in engineering from an accredited program.
- Experience: Engineers seeking licensure usually need to accumulate a certain amount of work experience under the supervision of a licensed professional.
- Examinations: Licensure often involves passing rigorous examinations, such as the Fundamentals of Engineering (FE) exam for entry-level engineers and the Professional Engineer (PE) exam for experienced professionals.
- Ethical Standards: Engineers are expected to adhere to a code of ethics and professional conduct. Obtaining a license indicates that the engineer has demonstrated a commitment to ethical behavior in their practice.

Lecture 9

ASME Fundamental Principles

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

- using their knowledge and skill for the enhancement of human welfare
- being honest and impartial, and serving with fidelity their clients (including their employers) and the public
- striving to increase the competence and prestige of the engineering profession

ASME Fundamental Canons

- Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties
- Engineers shall perform services only in the areas of their competence
- Engineers shall respect the proprietary information and intellectual property
- Rights of others

Lecture 10

The primacy of safety

- The huge influences of modern technology – for good and bad – based on small differences
- Engineers are responsible for the consequences that result from the intended and unintended – but foreseeable – effects of engineering
- An analogy between engineers and social experimenters

Engineering as Social Experimentation

Similarities

- Engineers / social experimentation = scientists / scientific experiments (on human subjects)
- Outcomes are uncertain because the introduction of new technologies into society can have unknown consequences and deep repercussions

Differences

- Engineering activities can lack controls that would act as protections (e.g. no control group is established or alternative reality developed)
- The results of engineering activity has an effect on much larger scales.
- Responsibilities of engineers: greater than those of scientific experimenters

Responsibilities

- A primary obligation to protect the safety of human subjects and respect their right of consent.
- A constant awareness of the experimental nature of any project, imaginative forecasting of its possible side effects, and a reasonable effort to monitor them.
- Autonomous, personal involvement in all steps of a project.
- Accepting accountability for the results of a project

Safety

Freedom from harm - physical, psychological, emothinal, financial, etc.

Concern

- universal/cross-cultural,
- stemming from evolved biological instincts
- protecting against death/serious injury

Objective and Subjective Safety

- Objective: the fact of not being in danger
    - “risk” = potential that something unwanted and harmful could occur/the likelihood of failure - severity of the consequences of failure
- Subjective: the feeling of not being in danger
    - important too since it influence the public opinion
- No product can ever be perfectly safe – in an objective sense – and be economically viable
- Not all possible consequences can be foreseen (bodily, psychological, economic, environmental)

Role responsibility

Conflict of interests

- Each human being plays many roles – employee, family, party member, etc.
- This can result in “conflicts of interests” = situations where the legitimate demands of two or more roles conflict, so that not all of one’s duties can be met
- Engineering duties – especially that of public safety – should always take priority, which is a potentially unreasonable expectation…

Lecture 11

Business

- Business exists to produce and develop goods and services for exchange, exchanging these for other goods, services, and money.
- Worldwide business currently exists in one dominant form: private enterprise aimed at profits
- Businesses where the owners also run the company and enterprises where ownership is separate from management.

Business and Engineering Ethics: Differences

- Foundations for making decisions: business – profits; engineering – implementation of technologies.
- Duty protect people from physical harm: technical experts vs a relatively ignorant public – not harm versus protect.
- Confidentiality and proprietary information – openness in obtaining informed consent from the public
- Responsibilities towards: shareholders/ stakeholders (business) versus public (engineering)
- Business is not as specialized as for engineers (engineers in order to be a professionals need education and preparation)

Organizational Ethical Principles

- Corporations and harms: Through their actions, corporations should endeavor to avoid producing unnecessary harms to those in and outside of their organizations
- Corporations and Fairness: Corporations should endeavor to ensure that all stakeholders of their organizations are treated fairly and justly
- Corporations and laws: Corporations should endeavor to ensure that all relevant laws and regulations are followed within their organizations.
- Corporations and Discriminations: Corporations should endeavor to protect members of their organizations against internal discrimination and harassment

Ethical principles for employees

- Corporate employees should endeavor to obey all legitimate, job-related directives.
- Corporate employees should endeavor to perform their contracted duties on at least an industrystandard level.
- Corporate employees should uphold the principle of confidentiality in relation to knowledge gained in present and past employment.
- Corporate employees should endeavor to avoid actions that harm the corporation in acting on behalf of the organization.
- Corporate employees should endeavor to be honest in their business relationships with others.

Principles of Involvement for Engineers

- Principle of public participation—Engineers should seriously consider participating in public policy discussions regarding future applications of technology.
- Principle of public education—Engineers should seriously consider helping the public to understand the applications of technologies in broader social, global contexts.
- Principle of engineering engagement—Engineers should seriously consider becoming involved in helping to improve the technological futures of those less fortunate than themselves, on a voluntary basis.

Stackholders

- Stakeholders are individuals, groups, or organizations that have an interest or concern in a particular project, decision, or outcome.
- They can be directly or indirectly affected by the actions or decisions of an entity and may have the ability to influence or be influenced by those actions.

Why stakeholders?

- Identifying Needs and Requirements
    - Stakeholders represent diverse perspectives, including end-users, customers, regulatory bodies, and communities affected by the technology.
- Enhancing Acceptance and Adoption
    - By involving stakeholders early in the engineering process, engineers can gain buy-in and build trust among key stakeholders.
- Minimizing Risks and Negative Impacts
    - Stakeholder involvement enables engineers to identify and mitigate potential risks, hazards, and negative impacts associated with the technology.

- Promoting Ethical and Responsible Innovation
    - Engaging stakeholders promotes ethical and responsible innovation by encouraging engineers to consider the broader societal implications of their work.

Lecture 12

Autonomy Definition

- “Autonomy” is closely related to individuality and refers to selfdetermination and independence from coercion, both internal and external, making decisions for oneself.
- “Autonomy” is closely related to knowledge and rationality in decisions made
- “Autonomy” is closely related to independent judgments result from autonomous thoughts

Autonomy Basis

- Professionals usually have high degree of autonomy because of their knowledge and expertise
- Professionals MUST be autonomous
- Expert authority - professional autonomy/independence (since employer might not share same preparation)
- Because of this authority professionals are also to be blamed for the actions they do on behalf of the clients especially in a paternalistic context (clients are not autonomous)

Lecture 13

Legitimate authority of employers

- Those in positions of authority are able to give orders, but engineers are not always obliged to follow all such orders.
- Suppose to follow: Contracted duties + those that are not illegal/unethical

Duty of Loyalty

- In becoming an engineer and receiving a paycheck, one owes a special allegiance to the professional group and company.
- Usually, it is enough to place loyalties hierarchically based on values
- Problem: When the demands for loyalty by two parties are absolute they lead to a conflict

Types of conflicts of interests

- Actual – when the interests of employers are certain to be negatively affected
- Latent – when there is a reasonable chance that the interests of employers will be negatively affected
- Potential – when one can reasonably foresee that the interests of employers might be negatively affected

Whistleblowing

> The violation of a corporate hierarchy to make known a clear danger or problem in an organization that is likely to cause serious physical harm to the public

- Morally permissible (praise if you do, but not blame if you do not do it)
    - serious harm will be done to the public
    - the employee makes his or her superiors aware of the problem,
    - the superior does nothing and the employee exhausts the corporate hierarchy
- Morally obligatory
    - the whistleblower has documentary evidence available, which would convince an objective observer, and
    - it is very likely that, as a result of the whistleblowing, the problem would be solved.

Opposition ot Whistle-blowing

- It is the action of a traitor who will hurt organizations and their employees.
- Whistle-blowers position themselves as morally superior to those who did not act.
- Engineers owe their greatest loyalties to the organizations for which they work.
- Whistle-blowing is often motivated by reasons that have little to do with public safety.
- Whistle-blowers could be mistaken, thus causing unnecessary harm to organizations.
- Whistle-blowers could destroy their careers.
- Engineering organizations might not support whistle-blowers.

In Favor of Whistle-Blowing

- The greatest professional duty of engineers is to the public and its safety.
- Great harm can be done if such wrongs are not corrected.
- Engineers have a right to free speech.
- The public will admire engineers as heroes.
- Engineers have the greatest amount of technical knowledge and, therefore, can make the most convincing case to the public.

RIGHTS OF ENGINEERS AS EMPLOYEES

> As a special category of employees, engineers have the right to

- blow the whistle (externally or internally) if, in their professional judgments, the physical safety of the public will be endangered as a result of their failures to act;
- obtain the resources necessary to perform their assigned tasks competently;
- inform the public of engineering decisions that have the potential to seriously harm the physical welfare of the public;
- fair compensation for their work, including the right to share equitably in gains resulting from their contributions to intellectual property.

Like all other employees, engineers have the right
to

- be protected from unnecessary harm in their employment;
- fair and just treatment by employers;D
- not be subjected to discrimination or harassment in their employment;
- be treated by their employers based on merit;
- have their contracts honored;
- disobey illegitimate employment directives.

Steps for case analysis

1. Identify the ethical issue

- Since defintion of ethics is “ethics concerns actions that have the potential to have a serious impact on the lives of others”
- We focus on what has impact on lives of others
- Direct and indirect, explicit and implicit, short-term and long-term
- There are a variety of possible actors in any case—humans and non-humans.
- There is almost always more than one issue
- Actions that have the potential to have a serious impact on the lives of other —> Who or what is being a ected, and how (=“stakeholders” e.g. employees, suppliers, customers, governments, local communities, and so on)?
- Questions about what should or should not be done —> Show the world can be different

2. Narrowing the focus

- Since every case has many different elements
- A complete discussion is impossible
- Better to focus on some elements
- The topics under consideration can be arranged in a hierarchical fashion, from the most to the least important
    - Severity ~ worst consequences
    - Scope ~ number affected
    - Direct cause

3. Determining Relevant Facts

A case does not only have many issues, but also
many facts

- Material facts (things which did not work properly)
- Facts regarding individuals (failure in action)
- Facts regarding organization

4. Making Reasonable Assumptions

- Not enough information should not lead to an excuse not to make a decision
- It is possible to make reasonable assumption

5. Undertaking Definitional Clarification

- Concepts and definitions are important for having a discussion with other people
- Cultural connotations can change the meaning of a concept
- Especially when “value connotations” play a role
- Clarity about words + precision in concepts
- Concepts can always be clarified

6. Conducting Ethical Analysis

- Review the set of available principles and decide which of them can be applied
- Check if there is a conflict with other principles
- If conflict exists, then you need to decide which one has the priority
- Decide if the set of principles is sufficient to make a decision

7. Reviewing Process

- Case analysis is an “iterative process”
- Go back and revise materials from earlier stages
- Completeness is more important than linearity/straightforwardness
- Pay attention to consistency and objectivity – watch out for subjective biases and subconscious elements

8. Resolving the ethical issue

- How can we solve the ethical issue?

9. Identifying practical constraints

- Practical constraints – make an ethically acceptable action too difficult to expect from someone in the set of circumstances under consideration, e.g., deeply ingrained cultural norms.
- Recognizing constraints can allow one to avoid ethical problems in the first place.

10. Avoiding Ethical Issues

- Case-study analysis helps one to think ahead and avoid serious ethical issues in future.
- Hypothetical discussions can help processes of decision-making/create more ethical environments
- Also moral imagination is another method that can help in avoiding ethical issues

Basic ethical principles for global engineering

1. keep members of the public safe from serious negative consequences resulting from their development and implementation of technology.
2. avoid damage to the environment and living beings that would result in serious negative consequences, including longterm ones, to human life.
3. engage only in engineering activities you are competent to carry out.
4. ensure that fundamental human rights are not negatively impacted as a result of their work with technology.
5. base engineering decisions on scientific principles and mathematical analyses, and seek to avoid the in uence of extraneous factors.

6. keep the public informed of engineering decisions, which have the potential to seriously a ect the public, and to be truthful and complete in their disclosures.
7. Loyalty, authority, friendship