

Ethics in Engineering

Semester 5 - Professionalism & Corporate Ethics

(303193304)

Learning Objectives

By the end of this lecture, students should be able to:

- Define **engineering ethics** and its significance in the profession.
- Analyse ethical dilemmas engineers face and propose solutions.
- Understand **professional responsibility** in engineering projects.
- Apply ethical principles in real-world engineering decisions.

Topics to be Covered

1. Introduction
2. Key Concept/Definitions
3. Content
4. Example
5. Activity
6. Conclusion
7. Learning outcome

Introduction

Ethics in engineering involves moral principles that guide engineers in their professional responsibilities. The scope of engineering ethics extends beyond personal conduct to encompass the impact on **society, environment, and economy**. It plays a crucial role in ensuring **safety, reliability, fairness, and sustainability** in engineering practices.

Key Concepts/Definitions:

Engineering Ethics: The study of moral values and responsibilities in engineering practice.

Professional Responsibility: Engineers' duty to prioritize safety, transparency, and societal welfare.

Whistleblowing: Reporting unethical practices in engineering organizations.

Sustainability: Ethical considerations in environmental impact and resource management.

Risk Analysis: Evaluating potential hazards in engineering design.

Engineering ethics encompasses:

1. **Safety & Public Welfare:** Engineers must ensure **structural integrity** in buildings, transportation, and machinery.

Example: Safety standards in bridge construction

2. **Environmental Responsibility:** Engineering projects should **minimize pollution and resource depletion**.

Example: Renewable energy solutions like solar power

3. **Honesty & Transparency:** Engineers should report issues and defects truthfully. **Example:** Disclosure of flaws in medical device designs

4. **Legal & Social Responsibility:** Engineers must adhere to **government regulations and social norms**. **Example:** Compliance with industry safety standards

Real-Life Examples:

- **Bhopal Gas Tragedy (1984):** Lack of ethical responsibility led to a major environmental disaster.
- **Volkswagen Emissions Scandal:** Engineers manipulated emissions data, violating ethical standards.
- **Challenger Space Shuttle Disaster (1986):** Engineering negligence caused catastrophic failure.

Content

- **Design & Development:** Safety considerations (e.g., product liability, risk assessment).
- Environmental impact (e.g., sustainable design, pollution control).
- Ethical implications of emerging technologies (e.g., AI, genetic engineering).
- **Manufacturing & Production:** Worker safety and working conditions.
- Quality control and product reliability.
- Waste management and resource efficiency.

Activity

Debate: Students analyse an ethical engineering dilemma and present solutions.

Case Study Analysis: Group activity on resolving real-world ethical violations.

Conclusion

- Engineering ethics is essential for **accountability, safety, and responsible innovation.**
- Ethical dilemmas require engineers to prioritize **public welfare** over personal gains.
- Engineers play a critical role in **sustainability, transparency, and integrity.**
- The scope of engineering ethics is vast and continually evolving with **technological advancements** and **societal changes.**
- It encompasses every stage of the engineering lifecycle, from **conceptualization to disposal.**

Learning Outcomes

- Students will be able to identify at least five distinct areas within the scope of engineering ethics.
- Students will be able to explain why ethical considerations are crucial in each of these areas.
- Students will be able to articulate the interconnectedness between technical decisions and ethical responsibilities.
- Students will gain an appreciation for the proactive role engineers play in upholding ethical standards.

Related Video to the Topic

- **Title Suggestion:** "Introduction to Engineering Ethics" or "The Importance of Ethics in Engineering"
- **Link Suggestion:**
- You can search YouTube for channels like "National Academy of Engineering," "PragerU" (for critical thinking on various topics, though often with a specific viewpoint), or educational institutions' channels.
- Look for videos that are concise, clearly explain the fundamental concepts, and ideally provide real-world examples.
- *Example Search Query:* "Ethics in engineering documentary" or "what is engineering ethics explained."

Thank You