

Lecture Notes

Professionalism & Corporate Ethics (303193304)

Ethics in Engineering: Case Studies

1. Content:

This lecture examines real-world case studies that highlight ethical dilemmas faced by engineers, the consequences of ethical decision-making, and best practices for professional integrity in engineering.

2. Learning Objectives:

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

- Analyse ethical dilemmas in engineering using real-world case studies.
- Identify key ethical principles violated or upheld in each case.
- Understand the impact of ethical decision-making in engineering on society.
- Apply ethical reasoning to engineering challenges.

3. Introduction

Case studies offer invaluable insights into ethical decision-making in engineering practice. Engineers frequently face challenges that test their moral principles, professional responsibilities, and adherence to ethical codes. Examining these real-world situations helps aspiring engineers understand the importance of ethical integrity.

4. Key Concepts/Definitions

- **Engineering Ethics:** The application of moral principles and professional standards to engineering decisions.
- **Ethical Dilemma:** A situation where two or more moral principles conflict, requiring careful decision-making.
- **Whistleblowing:** The act of reporting unethical behavior or violations in an organization.
- **Corporate Responsibility:** The accountability of companies in maintaining ethical standards and safety measures.
- **Public Safety:** Ensuring engineering decisions prioritize human safety over profit or convenience.

5. Detailed Explanation (with examples)

A. Why Case Studies Matter in Engineering Ethics

- Provide real-world examples of ethical dilemmas.
- Help engineers learn from past mistakes and best practices.

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- Demonstrate the consequences of ethical failures or successes.
- Encourage critical thinking and moral reasoning.

B. Ethical Decision-Making Frameworks

1. **Utilitarian Approach** – Making decisions based on the greatest benefit for the majority.
2. **Deontological Approach** – Adhering to professional duty and moral principles.
3. **Virtue Ethics** – Acting based on strong moral character.

6. Diagrams/Tables:

Case Study	Key Ethical Issue	Decision & Outcome
Challenger Disaster (1986)	Safety vs. Corporate Pressure	Engineers raised concerns, but launch proceeded, resulting in tragedy.
Volkswagen Emissions Scandal	Environmental Deception	Falsified emissions data led to legal and financial consequences.
Ford Pinto Case	Cost vs. Human Safety	Ignoring design flaws led to fatal accidents and lawsuits.

7. Real-Life Applications/Case Examples:

Case 1: Challenger Disaster (1986)

- Engineers at NASA and Morton Thiokol identified faulty O-ring seals in cold temperatures.
- Despite concerns, corporate pressure led to the launch, resulting in an explosion and loss of seven astronauts.
- Lessons: Ethical courage is crucial in preventing catastrophic failures.

Case 2: Volkswagen Emissions Scandal (2015)

- Volkswagen manipulated vehicle software to pass emissions tests while polluting at unsafe levels.
- Public trust eroded, leading to legal fines and recalls.
- Lessons: Ethical deception results in severe financial and reputational damage.

Case 3: Ford Pinto Case (1970s)

- Ford engineers knew the gas tank design could cause explosions in rear-end collisions.
- Cost-benefit analysis prioritized profits over human lives.

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- Lessons: Public safety must always outweigh financial savings.

8. Tips, Tricks, or Mnemonics:

*** Mnemonic for Ethical Decision-Making: T.R.U.S.T.**

- T** – Think about ethical principles.
- R** – Recognize risks and consequences.
- U** – Understand stakeholder impact.
- S** – Speak up if decisions compromise ethics.
- T** – Take action aligned with integrity.

9. Classroom Activity/Interaction

Debate & Discussion:

- Assign groups different ethical case studies.
- Ask students to argue the perspectives of engineers, executives, and affected individuals.
- Evaluate whether ethical frameworks were followed.

10. Summary/Key Takeaways:

- Case studies reveal the practical challenges of ethical engineering.
- Ethical dilemmas often involve conflicting interests and responsibilities.
- Engineers must uphold integrity, transparency, and accountability.
- Learning from past failures prevents future ethical mistakes.

11. References/Resources:

- National Society of Professional Engineers (NSPE) Code of Ethics
- Martin & Schinzinger, "Ethics in Engineering"
- IEEE Ethics Centre