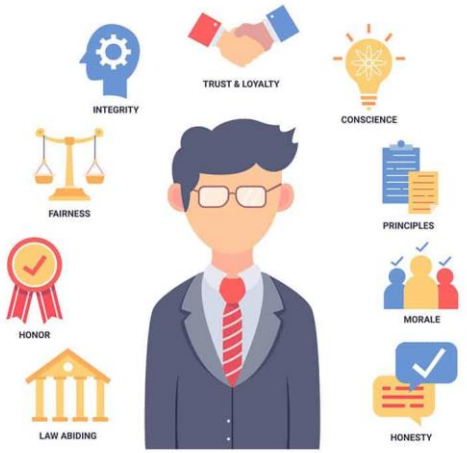
Reactor Design II-Ethics in Engineering



Week 13
Ethical Theories

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Introduction

- Definition: Ethical theories provide frameworks for understanding and resolving moral dilemmas.
- Purpose: Equip professionals with tools to navigate complex ethical decisions.
- Scope:
- - Understanding major ethical theories
- - Applications in engineering and Chemical Engineering

Topics to be Addressed

- Overview:
- 1. Utilitarianism
- 2. Deontology
- 3. Virtue Ethics
- 4. Ethics of Care
- 5. Applications and Case Studies

Objectives

- Purpose of this Presentation:
- - Explore key ethical theories and their principles
- - Highlight practical applications in engineering
- - Analyze case studies for lessons learned
- - Promote ethical awareness in professional contexts

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Importance of Ethical Theories

- Why Learn Ethical Theories?
- - Structured decision-making
- - Consistent ethical judgments
- - Avoiding bias in moral reasoning
- Applications in Engineering:
- - Designing sustainable processes
- - Balancing safety and cost
- - Resolving ethical conflicts

Types of Ethical Theories

- Categories:
- - Utilitarianism
- - Deontology
- - Virtue Ethics
- - Ethics of Care
- Overview: Each theory offers a unique perspective on moral reasoning.

Utilitarianism

- Definition: The morality of an action is determined by its outcomes.
- Types:
- - Utilitarianism: Greatest good for the greatest number
- Example: Minimizing environmental harm in Chemical Engineering projects.

Deontology

- Definition: Morality is based on adherence to rules or duties.
- Key Principles:
- - Universality: Actions should apply universally
- - Respect for individuals
- Example: Following safety regulations despite higher costs.

Virtue Ethics

- Definition: Focus on the character and virtues of the individual.
- Key Virtues:
- - Honesty, integrity, courage
- Application: Encouraging ethical leadership in engineering teams.

Ethics of Care

- Definition: Emphasizes relationships and responsibilities.
- Core Ideas:
- - Importance of empathy and compassion
- - Focus on context-specific decisions
- Example: Prioritizing employee well-being in decision-making.

Comparison of Ethical Theories

- Key Differences:
- - Focus on outcomes (Utilitarianism) vs. rules (Deontology) vs. character (Virtue Ethics)
- Choosing a Theory: Depends on the context and moral issue.
- Example: Balancing cost, safety, and stakeholder concerns.

Ethical Theories in Engineering Practice

- Applications:
- - Evaluating design choices
- - Risk management
- - Environmental sustainability
- Case Example: Implementing renewable energy technologies.

Case Study 1 - Deepwater Horizon Oil Spill

- Background: Explosion and oil spill in the Gulf of Mexico (2010).
- Ethical Analysis:
- - Consequentialism: Assessing environmental and economic impacts
- - Deontology: Adherence to safety protocols
- - Virtue Ethics: Integrity of leadership

Case Study 2 - Volkswagen Emissions Scandal

- Background: Manipulation of emissions testing data.
- Ethical Failures:
- - Lack of adherence to regulations (Deontology)
- - Prioritization of profits over societal good (Utilitarianism)
- - Compromised corporate integrity (Virtue Ethics)

Challenges in Applying Ethical Theories

- Key Issues:
- - Conflicts between theories
- - Context-specific dilemmas
- - Balancing competing interests
- Example: Balancing cost vs. safety in product design.

Integrating Multiple Ethical Theories

- Why Combine Theories?
- - Comprehensive decision-making
- - Addressing complex issues
- Approach:
- - Use Utilitarianism for outcomes
- - Apply deontology for rules
- - Emphasize virtues for character

Ethical Theories in Chemical Engineering

- Applications:
- - Waste management and recycling
- - Process safety and hazard analysis
- - Balancing innovation with ethical considerations
- Example: Developing sustainable catalysts.

Ethical Decision-Making Frameworks

- Frameworks:
- - Combining ethical theories
- - Using decision matrices
- - Stakeholder analysis
- Example: Designing eco-friendly chemical processes.

Future Trends in Ethical Theories

- Emerging Challenges:
- - Artificial intelligence and automation
- - Biotechnology and genetic engineering
- - Climate change mitigation
- Role of Ethical Theories:
- - Providing guidance for new dilemmas

Promoting Ethical Awareness

- Strategies:
- - Ethical training in engineering education
- - Leadership by example
- - Encouraging open dialogue
- Example: Hosting ethics workshops in engineering firms.

Summary

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- Key Takeaways:
- - Ethical theories offer diverse perspectives on moral reasoning.
- - Practical applications are essential in engineering.
- - Case studies highlight the relevance of ethics in real-world scenarios.

Questions and Discussion

- Prompt for Audience:
- - Which ethical theory resonates most with your professional decisions?
- - Share examples of ethical challenges you have faced.
- Thank You!

Are you ready?

Summary

- Key Takeaways:
- - Ethical theories provide structured frameworks for moral reasoning.
- - Applications in engineering ensure sustainable and responsible practices.
- - Real-world case studies demonstrate the importance of ethics in action.
- Call to Action: Integrate ethical reasoning into education and industry.