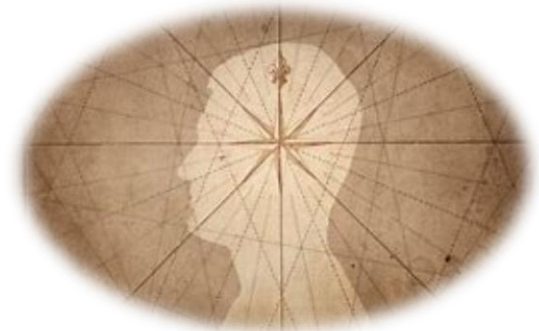


Reactor Design II-Ethics in Engineering



Week 11 Moral Sensitivity

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Introduction



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- **Definition of Moral Sensitivity:**

Moral sensitivity refers to the ability to identify ethical issues, recognize the impact of one's actions on others, and understand the moral dimensions of a situation.

- **Importance in Ethics:**

It serves as the foundation for ethical decision-making, enabling individuals to consider the consequences of their actions on others' rights, well-being, and dignity.

- **Examples:**

- Noticing when a co-worker's safety is at risk due to unsafe practices.
- Recognizing environmental harm from an industrial process before it escalates.

Topics to be Addressed



- **Understanding Moral Sensitivity:**
 - ✓ Components: Awareness of ethical issues, empathy, and moral reasoning.
 - ✓ Recognizing ethical dilemmas in professional scenarios.
- **The Role of Ethics in Engineering:**
 - ✓ Professional codes of ethics (e.g., AIChE Code of Ethics).
 - ✓ Balancing business goals with ethical responsibilities.
- **Ethical Dilemmas in Chemical Engineering:**
 - ✓ Handling conflicting interests (e.g., profit vs. safety).
 - ✓ Managing environmental and societal impacts of industrial operations.
- **Practical Application:**
 - ✓ Case studies highlighting moral sensitivity in chemical engineering.

Objectives



- By the end of this session, participants will be able to:
 1. Define moral sensitivity and its components.
 2. Recognize ethical dilemmas in chemical engineering scenarios.
 3. Analyze real-world cases where moral sensitivity played a critical role.
 4. Develop strategies to improve moral sensitivity in engineering practice.

Introduction



- **Why Moral Sensitivity Matters in Engineering:**
Engineers are responsible for designing systems and processes that impact public safety, environmental sustainability, and societal well-being.
- **Focus on Chemical Engineering:**
In chemical engineering, moral sensitivity is critical for:
 - Ensuring safe handling of hazardous materials.
 - Mitigating risks in reactor operations.
 - Minimizing environmental impact through sustainable practices.

- Case Study 1: Bhopal Disaster (1984):
 - - Ethical Failures: Ignoring safety protocols, underestimating hazardous chemical leaks.
 - - Lessons: Recognizing early warning signs, prioritizing human safety over cost-cutting.
- Case Study 2: Flint Water Crisis (2014):
 - - Ethical Failures: Overlooking the impact of contaminated water supply on public health.
 - - Lessons: Advocating for transparency and accountability.

Moral Sensitivity in Action



- Case Study 1: Bhopal Disaster (1984):
 - - Ethical Failures: Ignoring safety protocols, underestimating hazardous chemical leaks.
 - - Lessons: Recognizing early warning signs, prioritizing human safety over cost-cutting.
 - - Chemical Engineering Insight: Highlighting the importance of rigorous safety audits in handling methyl isocyanate.
- Case Study 2: Flint Water Crisis (2014):
 - - Ethical Failures: Overlooking the impact of contaminated water supply on public health.
 - - Lessons: Advocating for transparency and accountability.
 - - Chemical Engineering Insight: Emphasizing the role of corrosion control measures in water treatment systems.

Moral Sensitivity in Chemical Engineering



- What is Moral Sensitivity in Chemical Engineering?
- - Recognizing ethical challenges in chemical processes.
- - Understanding risks to human safety, environmental health, and societal welfare.

Moral Sensitivity in Chemical Engineering



- What is Moral Sensitivity in Chemical Engineering?
- - Recognizing ethical challenges in chemical processes.
- - Understanding risks to human safety, environmental health, and societal welfare.
- - Evaluating the environmental impact of chemical manufacturing and waste disposal.

The Role of Engineers in Ethical Decision-Making



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- - Balancing economic pressures with ethical responsibilities.
- - Advocating for sustainable practices and transparency.

The Role of Engineers in Ethical Decision-Making



- The Role of Engineers in Ethical Decision-Making:
- - Balancing economic pressures with ethical responsibilities.
- - Advocating for sustainable practices and transparency.
- - Developing innovative technologies to reduce emissions and waste.
- - Ensuring compliance with environmental regulations and process safety standards.

Case Study: T2 Laboratories Explosion (2007)



- Incident:
 - - Explosion due to thermal runaway in a chemical reactor.
- Failures:
 - - Inadequate risk assessment, lack of emergency preparedness.
- Lessons:
 - - Proactive safety protocols and moral accountability.

Case Study: T2 Laboratories Explosion (2007)



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 - - Explosion due to thermal runaway in a chemical reactor.
- Failures:
 - - Inadequate risk assessment, lack of emergency preparedness.
- Lessons:
 - - Proactive safety protocols and moral accountability.
 - - Chemical Engineering Focus: Designing reactors with advanced control systems to prevent thermal runaways.



Case Study: Ammonium Nitrate Explosion in Beirut (2020)

- Incident:
 - - Explosion caused by improper storage of ammonium nitrate.
- Failures:
 - - Neglect of safety regulations, lack of accountability.
- Lessons:
 - - Proper handling of hazardous materials and compliance with safety standards.



Case Study: Ammonium Nitrate Explosion in Beirut (2020)



- Incident:
- - Explosion caused by improper storage of ammonium nitrate.
- Failures:
- - Neglect of safety regulations, lack of accountability.
- Lessons:
- - Proper handling of hazardous materials and compliance with safety standards.
- - Chemical Engineering Focus: Implementing real-time monitoring systems and robust storage protocols for high-risk chemicals.



Are you ready?



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Summary



- - Moral sensitivity enables engineers to foresee and address ethical challenges.
- - Promotes accountability, empathy, and ethical decision-making.
- - Critical for public safety, sustainability, and societal well-being.
- Building moral sensitivity ensures engineering processes align with ethical values and sustainability.