

**COURSE MER/EER 573**  
**Case Studies in Failure and Ethics in Engineering**  
**Winter, 2012**

**Professor:** Dean Poeth, Ph.D., P.E., C.Mfg.E.  
**Class:** Steinmetz NWSE 210 Tuesday & Thursday 6:30-8:20 PM  
**Office:** Graduate Center, Room 223  
**Office Hours:** By appointment  
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**Description:** This course provides a broad look at engineering failures and ethics in engineering. The course will focus on engineering failure case studies and the principles of applied engineering ethics.

**Required Text:** Engineering Ethics: Concepts and Cases, Harris, Pritchard and Rabins, 3rd edition, 2005. Wadsworth. ISBN 0-534-60579-6. The references in the syllabus are to this book.

**Course Objectives:** To understand engineering disasters and to learn from these failures. To prepare engineers for the ethical decisions they may face in their professional careers. To understand some of the classic cases in engineering ethics and some of the typical ethical and professional problems that arise in the practice of engineering. To improve skills in effective communication, both oral and written, especially with regard to ethical and professional issues in engineering.

## **Part One: Foundations of Ethics and Professionalism**

### **Class 1**

Course Introduction

Discussion of Chester Barnard's 1938 classic management text The Functions of the Executive. The formal and informal organization.

Case study: The Hyatt walkway collapse.

Discussion of final class presentations and reports

### **Class 2**

Personal Ethics, Professional Ethics & Common Morality (Ch.1)

Factual, Conceptual, Application & Moral Issues (Ch. 3, sections 3.1-3.7)

### **Class 3**

Discussion Section: Factual, conceptual, application, and moral issues (Cases 8, 13).

Line Drawing & Creative Middle Ways (Ch. 3, sections 3.8-3.10)

Impediments to responsible action (Ch. 2, section 2.6)

### **Proposals Assigned**

**Class 4**

Discussion Section: Line Drawing, Creative Middle Ways (Cases 10, 30, 39, 41)  
Case study: Collapse of the World Trade Center

**Class 5**

Case study: The Johnstown flood.  
Moral Theories: Utilitarianism (Ch. 4, section 4.1-4.4)

**Class 6**

Case study: The Columbia tragedy. Dr. Jim Smiley guest lecturer  
*Challenger* and *Columbia* Accidents, Normalizing Deviance (Ch. 7, section 7.5)  
Roger Boisjoly, Morton Thiokol Engineer  
Self Deception (Ch. 2 section 2.6)  
Discussion Section: Utilitarianism (Case 24)  
Engineering Codes and Registration (Pages 365-379)

**Class 7**

Moral Theories: Respect for Persons (Ch. 4, sections 4.5-4.8)  
Discussion Section: Respect for Persons (Cases 32, 34)  
Informed consent  
Case study: The Ford Pinto

**Class 8**

**Proposals Due**

Case study: The Therac-25

**Class 9**

**Final Report Assigned**

**Report Outline Assigned**

Engineers as Employees (Ch. 8)  
New York "at will" employment

**Class 10**

Professional Responsibility (Ch. 2)  
Professional Integrity: Forms of Dishonesty, Conflicts of Interest, Confidentiality,  
Intellectual Property, etc. (Ch. 5)

**Class 11**

**Report Outline Due**

**Peer Review of Report Outline (Bring 4 copies to class – 1 to turn-in, 3 for peer review).**

Discussion Section: Review of Moral Problem-Solving Techniques  
Review for Mid-Term Exam

## **Part Two: Applications of Foundational Concepts**

### **Class 12**

#### **Mid-Term Exam**

Risk and Safety in Engineering Part 1 (Ch. 7)

### **Class 13**

Obedience to authority: the Milgram experiments

Groupthink

Mid-Term Exam returned & review

### **Class 14**

Risk and Safety in Engineering Part 2 (Ch. 7)

International Engineering Professionalism (Ch. 10)

### **Class 15**

International Engineering Professionalism (Continued)

Discussion Section: International Cases, (Case 31).

Case study: Three Mile Island

Case study: Chernobyl

### **Class 16**

Case study: Fukushima Daiichi

Engineering and the Environment

Discussion Section: Professional Obligations Regarding the Environment (Ch. 9.7-9.8)

Case study: Goiania, Brazil 1987

### **Class 17**

#### **Class Presentations**

### **Class 18**

#### **Class Presentations**

### **Class 19**

#### **Class Presentations**

### **Class 20**

#### **Class Presentations and Final Reports Due.**

#### **Final Exam (Date TBD)**

### **Grading**

Final course grades will be based on the following weighting:

Written proposals: 5%  
Report outline: 5%  
Final class written report: 15%  
Homework: 20%  
Mid-term exam: 20%  
Final class presentation: 15%  
Final exam: 15%  
Class preparation and participation, quizzes: 5%

**Mid-Term Exam and Final Exam:** These exams will focus on both lecture and textbook material. Some material from the book does not appear in the lectures and some lecture material does not appear in the book. Make sure you study both. All exams are closed book, closed notes.

**Graded Assignments** must be typed, double-spaced, Arial 11 font. All assignments are due in hardcopy and stapled at the beginning of class. No email submissions. Late assignment deduction: 10% per day. Writing quality (including spelling and grammar) as well as content will be evaluated. Assignments must be within the prescribed page limits. Students may work together on assignments, but each must turn-in a separate and original submission for grading.

**Report and Class Presentation:** The goal of this final project is to research an ethics/failure topic of your own choosing (with instructor approval) and present that research in the form of a report and class presentation. The topic cannot be one discussed in class, but may be one of the unused cases in the textbook.

The research must be accurate, show insight, be complete, contain original thinking (i.e., it cannot be simply a summary of other's work) and demonstrate understanding-in-depth of ethics and failure.

Each student will select three topics of interest (ranked 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choice) and present each for consideration in the form of a brief proposal. Students are encouraged to propose topics in which they have a personal interest and are enthusiastic about learning in-depth. The student and instructor will then select one of the three topics for the project.

**The Use of Laptops,** cell phones, and other personal electronic devices is distracting to fellow students and therefore is prohibited except during breaks.

**Academic Integrity.** You are expected to practice academic honesty in every aspect of this course. Make sure you are familiar with the Union Graduate College Student Handbook, especially the section entitled Academic Honesty and Student Conduct Policies which begins on page 30 (<http://www.uniongraduatecollege.edu/pdf/UGCStudentHandbook.pdf>). Students who engage in academic misconduct are subject to university disciplinary procedures, as well as consequences with regard to this course.

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