COURSE MER/EER 573
Case Studies in Failure and Ethics in Engineering
Spring, 2014

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 224

Office Hours: By appointment

E-Mail: poethd@uniongraduatecollege.edu

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
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 7
Proposals Due
Case study: The Therac-25
Engineering Ethics and Big Data

Class 8
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 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. 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 1st, 2nd, and 3rd 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.