

## ESG 201 LEARNING FROM DISASTER – DEC H (REQUIRED)

Credit: 3

### COURSE CATALOG DESCRIPTION:

The role of the engineer is to respond to a need by building or creating something along a certain set of guidelines (or specifications) which performs a given function. Just as importantly, that device, plan or creation should perform its function without fail. Everything, however, does eventually fail and, in some cases, fails with catastrophic results. Through discussion and analysis of engineering disasters from nuclear meltdowns to lost spacecraft to stock market crashes, this course will focus on how modern engineers learn from their mistakes in order to create designs that decrease less of a chance of failure.

**PRE- OR COREQUISITE(S):** One D.E.C. category E (Natural Sciences) course

**TEXT(S) OR OTHER REQUIRED MATERIAL:** James R. Chiles, “Inviting Disaster: Lessons from the Edge of Technology”, Harper Business, 2002

#### Suggested Texts:

**Set Phasers on Stun: And Other True Tales of Design, Technology, and Human Error**, by Steven Casey, Aegean Publishing Company, Santa Barbara, 1998

**To Engineer Is Human: The Role of Failure in Successful Design** by Henry Petroski, Random House, 1992

COURSE LEARNING OUTCOMES	SOS	ASSESSMENT TOOLS
Understanding the causes of engineering failure	c e g j	Report; presentation
How engineering failures have resulted in better designs	c i	Report; portfolio assignment
Understanding the role of engineering ethics in engineering failures and disasters	g f h	Presentations

### COURSE TOPICS:

Week 1. What makes an engineering failure into an engineering disaster (perception of risk)

Week 2. How do things fail? A discussion of failure modes.

Week 3. Case studies: A history of disaster: From the Bent Pyramid to the Space Shuttle Challenger

Week 4. Disasters of the nuclear age: Chernobyl, Three Mile Island and Idaho Falls

Week 5. The professional engineering Code of Ethics; examples of ethical problem solving

Week 6. Case studies: Galloping Gertie; The CW Post dome collapse and the nature of design

Week 7. The role of materials in engineering failure (and success)

Week 8. Case studies: 9/11 and the World Trade Center; Liberty Ships in WWII

Week 9. The “blind spot” in design and failure; the I-95 bridge collapse; the Ocean Ranger oil rig disaster; the loss of Lake Peigneur; the Columbia disaster

Week 10. Case studies: Information age disasters: Black Monday stock market crash; “Set phasers on stun”, and misplaced Mars missions

Week 11. Case study: Tsunamis, Katrina and the rebuilding of New Orleans

Week 12. Learning from Disaster: from the Scorpion to the Seawolf submarine, and from Mir to the International Space Station

Week 13. Designing for disaster: Earthquake-resistant design;  
The future of disaster: Can we eliminate failure?

Week 14-15 Class presentations on semester projects

**CLASS/ LABORATORY SCHEDULE:**

ESG Spring	201	Learning from Disaster	LEC	1	MW	3:50PM	5:10PM
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**CURRICULUM:**

This course contributes 3 credit hours toward meeting the required 48 hours of engineering topics.

**STUDENT OUTCOMES (SCALE 1-3):**

A	B	C	D	E	F	G	H	I	J	K
		3		2	2	3	2	2	2	

**3 – Strongly supported**

**2 – Supported**

**1- Minimally supported**

**LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:**

Gary Halada, SEP 15, 2016