PSYCHOLOGY 4961-01 (CRN 12579)
Professional Development 2 (2 credits)

General Information

Instructor: Michael J. Kalsher
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Office hours: by appointment

Class Schedule: Monday and Thursday; 1:30 - 3:35 p.m. Troy 2012

Course Web Site: Kalsher.com: All lecture slides and any updates posted here.

Course Description & Learning Goals

This course focuses on increasing students' knowledge concerning the impact of non-technical issues on the viability of technical (engineering) designs and solutions. The non-technical issues we will consider include the cognitive and physical strengths and limitations of people in the chain spanning from product/equipment designers/manufacturers to end users, as well as economic, environmental, cultural and societal influences. During the course we will read and discuss/debate case studies in which the technical solution pursued did not have the desired effect because the people involved focused too much on the technology without paying sufficient attention to the environmental, economic, socio-cultural, and political issues associated with the technology's ultimate usage. Students will work individually, or in small teams, to design a system, component, or process to meet desired needs within realistic constraints (e.g., economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability).

Student Learning Outcomes

- Students will demonstrate their knowledge of the potential consequences of engineering solutions in a global, economic, environmental, political and social-cultural context by reading/discussing/debating case examples in which proposed technical solutions did not have the desired effects because those involved failed to adequately consider the aforementioned factors.
- Students will demonstrate their knowledge of the role of contemporary issues in the context of engineering.
- Students will design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Students will receive basic instruction on how to write a refereed conference/journal paper and will prepare a refereed type conference/journal paper based on their research associated with this course.
- Students will perform and receive peer reviews on drafts of the above mentioned paper.
- Students will present the results of their design projects in class.

Grading

Attendance **50 points** *(includes participation in in-class activities and class discussions).*

Quizzes: **100 points** (1 quiz per week @ 20 points/quiz during weeks 1-5 to ensure students read assigned materials/course notes in advance of the class in which they are presented and discussed.

Design Project: **100 points**

Presentation: **50 points**

Final Grade:

Grade	Range	Grade	Range
A	276 - 300	C	220 - 229
A-	269 - 275	C-	210 - 219
B+	260 - 268	D+	200 - 209
B	250 - 259	D	190 - 199
B-	240 - 249	D-	180 - 189
C+	230 - 239	F	Below 180

Course Policies

Attendance Policy.

Excused Absences are processed by Student Experience office (4th floor Academy Hall, x8022). It is beneficial for students to attend each lecture since there is course material covered in lecture that is not in the textbook. I feel that students are mature enough to make the important choice to attend lecture so that attendance is not taken. At each exam, please be prepared to show your student ID.

Academic Integrity

Student-teacher relationships are built on mutual respect and trust. Students must be able to trust that their teachers have made responsible decisions about the structure and content of the course and that they are conscientiously making their best effort to help students learn. Teachers must be able to trust that students do their work conscientiously and honestly, making their best effort to learn. Acts that violate this mutual respect and trust undermine the educational process. The Rensselaer Handbook of Students Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. Your collaborative project should reflect an equivalent amount of effort by each group member. Students

Policy on Collaboration and Cheating/Plagiarism

A grade of zero will be given on the first assignment where cheating or plagiarism is detected and will be reported to the Dean of Students. If there is a subsequent infraction the student will receive a grade of F for the course. If a student has any question concerning this policy before submitting an assignment, please ask for clarification.

Course Calendar

Note: This is a tentative schedule and subject to change depending on the progress of the class.

May 22nd - June 30th Tuesday, Thursday 1:30 – 3:35 p.m.

Date	Topic
Week 1 (5/22; 5/25)	Introduction to Human Factors Engineering This week we'll consider the role of HF principles in engineering design Quiz 1 https://youtu.be/Wl2LkzIkacM (Donald Norman: User-Centered Design) https://youtu.be/gnbc6laqx9s (Henry Petroski)
Week 2 (5/29; 6/1)	Research design and statistics This week's we'll focus on design of experiments (to evaluate form/function) Quiz 2
Week 3 (6/5; 6/8)	The Design of Everyday Things / Design project We will read and discuss Donald Norman's book "The Design of Everyday Things." Students will select and begin work on their design project (individually or small teams). Distribution of template for course project write-up Quiz 3
Week 4 (6/12; 6/15)	Norman book continued. Case Studies Quiz 4
Week 5 (6/19; 6/22)	Case Studies Quiz 5
Week 6 (6/26; 6/29)	Project Presentations Design project write-ups and presentation Powerpoint slides due on Friday, 6/30/17, by 5:00 p.m. EDT.

Course Reference Materials

(all book descriptions below are from Amazon.com)

Highly Recommended:

Norman, D. (2013). The design of everyday things. New York, NY: Basic Books.

Even the smartest among us can feel inept as we fail to figure out which light switch or oven burner to turn on, or whether to push, pull, or slide a door. The fault, argues this book, lies not in ourselves, but in product design that ignores the needs of users and the principles of cognitive psychology. The problems range from ambiguous and hidden controls to arbitrary relationships between controls and functions, coupled with a lack of feedback or other assistance and unreasonable demands on memorization. *G*ood, usable design is possible. The rules are simple: make things visible, exploit natural relationships that couple function and control, and make intelligent use of constraints. The goal: guide the user effortlessly to the right action on the right control at the right time.

Optional:

Casey, S.M. (1998). Set phasers on stun: And other true tales of design, technology, and human error. Aegean.

Technological disasters are frequently caused by incompatibilities between the way things are designed and the way people actually perceive, think, and act. Structurally sound aircraft plummet to the earth, supertankers run aground in calm weather, and the machines of medical science maim unsuspecting patients - - all because designers sometimes fail to reflect the characteristics of the user in their designs. Designers and the public alike are realizing that many human' errors are more aptly named designed-induced' errors. Most consumers experience the frustration of using many new products, but the problems consumers experience with modern everyday things are shared by the users of large-scale technologies where the consequences of design can go well beyond simple matters of inconvenience or amusement.

Petroski, H. (1992). To engineer is human: The role of failure in successful design. First Vintage Books Ed.

The moral of this book is that behind every great engineering success is a trail of often ignored (but frequently spectacular) engineering failures. Petroski covers many of the best known examples of well-intentioned but ultimately failed design in action -- the galloping Tacoma Narrows Bridge, the collapse of the Kansas City Hyatt Regency Hotel walkways, and many lesser known but equally informative examples.

Petroski, H. (1992). The evolution of useful things: How everyday artifacts—from forks and pins to paper clips and zippers—came to be as they are. New York, NY: A. Knopf.

This book may appear to be about the simple things of life--forks, paper clips, zippers--but in fact it is a far-flung historical adventure on the evolution of common culture. To trace the fork's history, Petroski travels from prehistoric times to Texas barbecue to Cardinal Richelieu to England's Industrial Revolution to the American Civil War--and beyond. Each item described offers a cultural history lesson, plus there's plenty of engineering detail for those so inclined.

Petroski, H. (1996). Invention by design: How engineers get from thought to thing. Cambridge, MA: Harvard University Press.

Petroski delves deeper into the mystery of invention, to explore what everyday artifacts and sophisticated networks can reveal about the way engineers solve problems.

Voland, J. (1998). Engineering by design (2nd Edition). Addison-Wesley.

This book introduces students to a broad range of design topics. The engineering design process provides the skeletal structure for the text, around which is wrapped numerous cases that illustrate both successes and failures in engineering design. The text provides a balance of qualitative presentation of engineering practices that can be understood by students with little technical knowledge and a more quantitative approach in which substantive analytical techniques are used to develop and evaluate proposed engineering solutions.

Wickens, C.D., Gordon-Becker, S.E., Liu, Y., & Lee, J.D. (2003). An introduction to human factors engineering (2nd Edition). Pearson.

This book describes the physical and cognitive capabilities and limitations of the human operator and how these should be used to guide the design of systems with which people interact. General principles of human-system interaction and design are presented, and included are specific examples of successful and unsuccessful interactions. It links theories of human performance that underlie the principles with real-world experience, without a heavy engineering-oriented perspective. Topics include design and evaluation methods; different systems such as visual, auditory, tactile, vestibular, automated, and transportation; cognition, decision-making, and aesthetics; physiology; and stress, safety, accidents, and human error. An excellent reference for personnel and managers in the workplace.