Human Factors Engineering

A quiet revolution is in progress in the field of human factors. This revolution is broadly based, finding a home not only in such traditional areas of research as workplace layout and industrial ergonomics, but also in more recent areas of research, such as human-computer interaction, intelligent transportation systems, aging, medical systems, and assistive technologies. No longer is a good or better solution adequate for the types of applied problems that arise in each of these various areas of research. Rather, the focus has turned to the best or optimal solution using many of the quantitative and computer techniques that were pioneered in industrial engineering and operations research. In this course, we look primarily at those applications which have evolved from our increasingly sophisticated understanding of the way humans receive, processes and transmit information.

Text


The text by Wickens and Hollands is required and should be available in the textbook annex for on campus students. You will need this text for exams and so cannot count on borrowing one from someone else during the exam period.

Readings

All students will be asked to read a set of 10-20 journal articles (the articles have three asterisks preceding them; they are italicized if they focus on transportation human factors issues). The articles are available either as downloadable files from the UMass Digital library (http://www.library.umass.edu/ and click on e-journals; you will need a password) or as hard copies in the one of the libraries on campus.

Homework Problems

Homework problems will be assigned on average once a week. Questions will come from the readings, the book, and the class lectures. You may discuss the homework problems with each other. But, you must not copy or paraphrase what another student has done. Homeworks will count 20% of the grade. Everyone is expected to do every homework. I will select a subset of problems to grade on each homework, one easy and one hard. To get a score of 9 out of 10, you must complete all of the
easy problems correctly. To get a score of 10 out of 10, you must complete all of the more difficult problems correctly.

**Hour Exams**

I expect to give two exams, the second during finals period. Note that for each exam you are responsible for all of the material assigned in the text and readings as well as all of the material we go over in class. Graduate students can expect questions in addition to those given to undergraduates. Each exam will count 30%.

**Research Project**

Everyone is expected to identify a research question that extends current research, design an experiment to answer the research question, run participants in the experiment, analyze the data, discuss the results, and write up everything for publication using the APA format. Examples of what is acceptable as research topics are found in journals like *Human Factors* and *Ergonomics*. You will want to keep your project simple so that you can run it with paper and pencil or a PC. The project will count 20%.

**Class Participation**

I expect everyone to participate in class, asking questions of me or the class when you have them and answering questions when I ask them of you. I typically ask at least one question of each person in class each day. My goal is to fine tune the lecture, making sure that the material is being understood and, if not, offering alternative explanations or expanding on a point.

**Important Dates**

- **February 12**: Project question and articles must be emailed
- **March 12**: Project question, literature review, experimental design, and analysis of hypothetical results emailed by midnight
- **March 12**: Take home exam, due Monday March 16
- **April 28**: First draft
- **April 30**: Laboratory Project Data Collection/Analysis

**Topics Covered**

It is very unlikely that we will be able to cover all of the topics below. Usually, we cover 10 of the 15 topics, those topics depending primarily on student interest and background.
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13. Attention as Resources

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* Process Control
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* Automation

* Applications
  Optimal Scheduling
  Fault Diagnosis

15. **Manual Control**

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* Tracking and Dynamic Systems
* Multiaxis Control
* Discrete Control Devices
* Modeling the Human Operator

* Applications
  Optimal Keyboard Layout
  Lateral Acceleration on Curves

16. **Stress and Human Error**

* Stress
* Human Error

* Applications
  Attention Allocation in Driving
SUGGESTED & REQUIRED READINGS

(Required readings are indicated by asterisks in the syllabus)


