Human factors is the psychology of how people interact with their machines or with their non-living environment. The interactions are usually occur in occupational settings, but they are equally relevant to consumer products, and health care delivery, public situations and perhaps other applications. The students learn: (1) the basic principles of controls and displays that apply to conventional machines, (2) principles and practical techniques for occupational safety and health, (3) to recognize special problems that are encountered with computer-based machines including web sites, (4) to extrapolate basic principles to complex systems and environmental design, (5) to devise corrections to real-world situations where any of the foregoing principles could be operating, and (6) to analyze a system for sources of human error under real conditions.

**TEXTS**

Dates that appear on the class schedule list target dates for topics. Each class day is not listed separately. Readings are given as book chapters in the text (T#). Readings from the special issue of Human Factors are designated as HF#, where the # is the starting page number for the article.


*Human Factors, 50*(3), 2008. Special 50th Anniversary issue. MU has an electronic subscription, so there is no need to buy this item. We will use it, however.

**CLASS SCHEDULE**

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPIC</th>
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<tbody>
<tr>
<td>1/20</td>
<td>Introduction to human factors (T1, HF351, HF368).</td>
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<tr>
<td>1/25</td>
<td>Usability evaluation methods (T2, HF418)</td>
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<tr>
<td>2/1</td>
<td>Systems that change over time (T2). Industry standards assignment topic choices due.</td>
</tr>
<tr>
<td>2/3</td>
<td>Signal detection theory (T3). Web assignment due. Term paper topic choices due.</td>
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1. **Conventional Machines**

2/8  | Vision and visual displays (T4, HF361, HF529) |
2/15 | Hearing auditory displays, noise (T5, HF380) |
2/22 | Cognition (T6, HF375, HF449, HF456). |
2/24 | Industry standards assignment due. |
3/1  | Psychomotor skill and controls (T7, HF468, HF506). |
3/3  | MIDTERM EXAM thru (T8) |
3/8 & 3/10 | More complex systems, automation (T13, HF397, HF442, HF404, HF540). Special assignment. Class does not meet these days. |
3/22 | Discussion of findings from special assignment. |

2. **Occupational Health and Safety**

3/24 | Anthropometry, work physiology (T8, HF393) |
3/31 | Accidents and occupational health (T10, HF418) |

3. **Computer-Based Machines**

4/7  | Controls, displays, computers (T11, HF385, HF556, HF560) |
4/14 | Programming, artificial intelligence, artificial life (T12) |

4. **Environments**

4/19 | Natural and built environments, transportation, outer space (T14, HF521) |
4/21 | Paper presentations, batch 1 |
4/26 | Paper presentations, batch 2 |
4/28 | Paper presentations, batch 3 |
5/3  | Paper presentations, batch 4 |
5/5  | Finish up everything left over. |
5/10 | FINAL scheduled. This room. 3:30 PM. |
WEB ASSIGNMENT

The assignment is to visit some web sites related to human factors and ergonomics. It’s a good way to immerse yourself in the topic. You should visit a few from industry, government, academic settings, and specialty private practices. Then, identify two that you thought were the most interesting to you and bring in some descriptions of them, prints of the home page or more substantive pages, along with the URL. (The URL is essential to this task). We’ll discuss your findings in class and visit the sites that you found.

OPERATING STANDARDS ASSIGNMENT

The assignment is to find formal standards associated with the proper design of visual displays, ergonomic conditions, etc. A more specific list of possibilities will be distributed in class separately. The class will divide up the topics, and everyone will give a brief presentation to the class on their findings, in the form of a group discussion. Standards may be issued by the American National Standards Institute (ANSI), Department of the Army, or DOD specifications for equipment that they buy, Automotive Manufacturing Institute (or similar organization), Federal Aviation Administration, or non-governmental professional engineering organizations. There may be some very different levels of “enforcement” associated with the different topics for standards. You may have to dig through human factors resources to find applicable standards.

Please limit your report to 5 pages, summarizing material as necessary. Be sure to answer the following: To what aspect of the display, machine, work environment does the standard pertain? What is the standard? What agency set the standard? What is the last known date of update for this standard? Provide literature citations and references, or web addresses to support your findings. Note that the library is full of resource material to poke through.

SPECIAL ASSIGNMENT: COMPLEX SYSTEMS

This is essentially a term paper assignment due mid-term as soon as we get back from break. Please do the readings listed in conjunction with the topic that you’ll be writing about, which is:

For the better part of the 20th Century people have imagined the possibility of building robots (humanoid or otherwise), and a variety of scenarios have been contemplated in novels and movies. What are the requirements for controlling these devices? Furthermore, the US Military has contemplated the use of swarms of robots. How does one make robots swarm, and how are the swarms controlled? What are the special challenges associated with swarming robots?

The paper should be about 10 pages in length. Please follow the instructions for the term paper for typography and use of references.

TERM PAPERS

A list of term papers topics will be handed out separately along with further instructions about how to compose it. The list will cover the full range of topics that are covered in this course, with a focus on the new challenges in the field. Students will be asked to select a topic early in course, and one of the goals of the process is to have each student cover a different topic.

The paper itself should be about 15-20 pages in length, including a full bibliographic citation of your technical references. Your material should include references to original research papers (books and especially the journals). A list of suggested journal is included with the details of the assignment.

CLASS PRESENTATIONS

All students will present their term paper topics in class. The time available per presentation will depend somewhat on the number of people who are enrolled in the class. Presentations will be scheduled for the last few days of class. The schedule of presentations will be made by SJG.

GRADUATE STUDENTS

Graduate students who are registered for this class as PSYC 5330 will write a second term paper with the same specifications for length and use of references are the term paper described above. The topic for the 5330 paper will be mutually decided by the student and SJG. The 5330 paper should provide a research plan for gathering new knowledge about the topic.

GRADES

Grades will be based on a midterm exam, a final exam, the robot paper, and the written term paper, each worth approximately 20% of the grade. The other 20% is associated with in-class activities, spontaneous written activities in class, the web assignment, the industry standards assignment, and the presentation portion of your term paper assignment.

Grades are assigned in this class on a percentages basis, such that A = 85% or better, AB = 80%, B = 70%, BC = 65%, C = 60%, CD = 55%, D = 50%, F = less than 50%. The historical odds, based on past classes, of obtaining BC or better: 70%; the odds of passing the course, 99%.