Human Performance
Psychology 436/536

TuTh 1400-1520
128 Chiles
CRN 35803/35804
4 Credits

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OVERVIEW

This course is an introduction to human factors psychology. As an introductory course, this course will be characterized more by breadth than by depth. We will examine how perceptual, cognitive, affective, and social psychological, and organizational processes affect human performance. We will examine how knowledge of these processes can be applied to design devices, procedures, training, and entire socio-technical systems so that they are safe, effective, and efficient.

Our focus will be on how psychological knowledge, theory, and research methods can be applied to understanding how humans interact with technology and their environment to perform tasks. In turn, we will examine how applied research can contribute to our understanding of the basic principles of human psychology.

The course will include analyses of major accidents and incidents. Students will learn to use simple human factors research and analysis methods.

OBJECTIVES

By the end of the course, students should have a broad familiarity with human factors psychology and the ways in which psychological research and methodology have been applied to address human factors problems. Students should be able to read the relevant literature and perform simple human factors analyses using standard psychological and statistical methods.

MATERIALS

- Wickens, C. D., Hollands, J. G., Banbury, S., & Parasuraman, R. (2013). *Engineering Psychology and Human Performance 4th Ed.* New York, NY: Pearson.
- Norman, D. A. (2013). *The Design of Everyday Things: Revised and Expanded Edition*. New York, NY; Basic Books
- Additional materials available on Canvas.

In the syllabus below, N=Norman text, W=Wickens text, R=additional reading available on Canvas.

Syllabus & Reading List

Please read the material before the date listed and come to class prepared to discuss it.

Introduction		
4/3	Thinking About Human Error W 1: Introduction	
4/5	Cognitive Task Analysis R: SwissAir 111 R: CTA Handout	
4/10	Design of Everyday Things: Knowledge, Constraints, & Affordances N 1-4	
4/12	Human Error N 5	
4/13	Paper Overview Due	
Sensation, Perception, & Attention		
4/17	Signal Detection & Information W 2: Signal Detection R: Three Mile Island	
4/19	Attention & Perception W 3: Attention W 4: Spatial Displays R: JFK Jr. Accident	
4/20	Online Quiz Weeks 1-3	
4/24	Spatial Cognition W 5: Spatial Cognition & Navigation R: Royal Majesty	
4/26	Human Centered Design N 6-7 R: Anesthesia Errors	
4/27	Paper Outline Due	
Communication		
5/1	Language & Communication W 6: Language & Communication R: Tenerife/KAL 801	
5/3		
5/4	Online Quiz Weeks 4-5	

Storage & Retrieval		
5/8	Memory & Procedures W 7: Memory & Training R: Spannair 5022	
5/10		
Decision-Making		
5/15	Decision Making W 8: Decision Making R: Columbia	
5/17	Risk Assessment	
5/18	Online Quiz Weeks 6-7	
	5/18-5/23	
Special Topics		
5/22	Multitasking W 9: Selection of Action; W 10: Multitasking	
5/24	Affect & Stress W 11: Mental Workload, Stress, & Individual Differences R: Colgan 3407	
5/25	Paper Draft Due	
	5/28-6/12	
5/29	Automation W 12: Automation & Human Performance R: TA 1951	
5/31		
6/1	Online Quiz Weeks 8-9	
6/5	Group & Organizational Issues R: Challenger	
6/7	Summary	
6/8	Review Session: TBD	
6/8	Final Paper Due	
6/11	Final Examination: 12:30	

UNDERGRADUATE CLASS REQUIREMENTS

Undergraduate students will be expected to complete three online quizzes, the final examination, and a term project paper. There will be four online open-book quizzes during the term (see syllabus for schedule). Your lowest score will be deleted. Each remaining quiz will count for 10% of your final course grade (for a total of 30% of your grade). The final examination will count for 30% of your grade. The paper will count for 40% of your grade.

Examinations. The examinations will be designed to test both declarative knowledge of the course material and your ability to apply your knowledge.

The quizzes will be composed of multiple choice questions designed to test declarative knowledge and your ability to directly apply your knowledge. They should help you assess your learning as the course progresses. These weekly quizzes will be relatively short. They will become available on Friday morning at 0800 and will be available for you to complete until Saturday morning at 0800. Once you begin the quiz, you will have 60 minutes to complete the quiz. You should complete the quiz on your own but you may use any materials that you have available to you.

Each week, a set of questions will be posted to help guide your studies. The examination questions will be based on answers to these study questions and applications of those answers to new problems. The final examination will be comprehensive and utilize the same format as the midterm examinations. A review session will be scheduled prior to the final examination.

Term Project Paper. The term project paper is designed to give you the opportunity to apply what you are learning about human factors psychology to the analysis of a task, technology, or event. We expect that you will devote a substantial amount of time during the term to working on this project and that your final paper will reflect that work. I hope that the project will provide a fun and useful way to learn the material. However, this is NOT an opportunity for unguided personal reflection. It IS an opportunity for you to apply the *scientific knowledge and methods that you have learned* to a real situation. Below are some topic ideas:

Expanded analysis of an accident/event covered in class.
See the syllabus for a list of the major accidents covered in class.

Analysis of an accident/event not covered in class.
Several government agencies and non-profit organizations investigate and report on commercial accidents that you can search (e.g., NTSB investigates aviation, railroad, commercial ground transportation; NRC investigates nuclear power accidents). See the resource list for links.

Analysis of a socially important task or technology
For example, you could examine issues with self-driving cars or urban aerial mobility.

Analysis of a task in which you participate (whether or not it is socially important)
For example, you could discuss the human factors associated with following recipes in the kitchen. You could describe the human factors involved in climbing, dancing, or performing any sport, musical, or artistic activity.

Analysis of a technology that you use
For example, you could describe the human factors associated with a problem you have using your computer, cell phone, or heating system.

The paper should follow the following format:

1. Title Page (1 page): list author's name and affiliation
2. Problem Statement (1 paragraph – 1 pages): briefly describe the task, technology, or event to be analyzed.
3. Outline (1 page)
4. Analysis (10-15 pages): apply what you have learned about human factors (substantive knowledge and methods) to the issue described above.
    a. Describe how particular psychological processes affect how the task is performed, how humans interact with the technology used, and/or how the event unfolded. Be specific. Document how you know what you claim. Every statement of fact should have an appropriate citation. You should rely mainly on trusted sources such as academic journals and government documents. In general, the "internet" is not a trusted source. See the resources module for some useful links. Cite thoroughly using footnotes and/or APA style citations.
    b. Use <u>each</u> of the headings from the *Cognitive Task Analysis* handout as sub-headings. If there are no important issues related to a category, write "None."
5. Interventions (1-2 pages): describe what interventions could be used to address any identified problems
6. References (length as needed): Use APA style references.

To assist you in successfully completing your project, you are required to turn in a project overview describing what you intend to do (1% of total grade) and a detailed project outline listing the particular issues that you intend to address (2% of total grade) on the dates specified in the syllabus. You are also required to turn in a draft of your final paper (2% of total grade) for comments on the date specified in the syllabus.

The paper should be as long as it needs to be. We expect that the paper will be about 15-20 pages long (counting title page, problem statement, outline, analysis, interventions, and references) -- double spaced, 1" margins, 12 point Times New Roman font).

Collaborative projects are encouraged. If you would like to collaborate with another student on a project, please see the instructor.

<u>Term Project Grading Criteria</u>

Papers will be evaluated on three equally weighted dimensions:

<u>Writing</u>. The writing should be grammatical, using properly spelled words in a clear, concise, and precise manner. Words should be chosen for their precise meaning, not to "sound smart." Do not be redundant.

<u>Content</u>. Each issue should be covered completely using all of the appropriate materials you obtain. All materials that you use should be properly and consistently cited using APA style.

<u>Analysis</u>. Analyses should be based on clearly stated assumptions and/or cited facts. Each step in the analysis should be clearly based on previously stated assumptions or cited facts or be a logical deduction from the assumptions or facts previously stated in the paper. Any opinions that you offer should be clearly distinguished from empirical findings and logical conclusions.

Each dimension will be scored using the following rubric:

9-10	Excellent:	there may be a few minor faults but there are no substantial problems that need to be corrected
7-8	Very good:	there are multiple minor faults or a substantial problem but no major faults that need to be corrected
5-6	Good:	there are many minor faults or more than one substantial problem or a major fault, but no fundamental errors
3-4	Needs improvement:	there are many major problems or a fundamental error that need to be corrected
1-2	Poor:	there are a large number of serious problems; a major rewrite of the paper would be necessary

GRADUATE CLASS REQUIREMENTS

Graduate students will be expected to complete a term project and the final examination. For graduate students, the final report of the term project and the final examination will each be worth 50% of the grade. Please meet with the instructor to discuss your interests and how they can be incorporated into the term project.