

Human Factors in System Design

EIN 5249

Academic Term: Fall 2025

Instructor:

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Office Hours: Tuesdays and Thursdays 2 – 3 PM (*or by appointment*). In-person and Zoom.

Office Location: Weil 477

Class Periods and Location:

- Section 1:
 - T, Period 6 (12:50 PM – 1:40 PM), TUR L011
 - R, Periods 5-6 (11:45 AM – 1:40 PM), NRN 3035
- Sections 2 & 3: *Online*. Links can be found on Canvas under *Zoom Conferences* if you prefer to join the lectures, but recordings will be shared after class.

Course Description

This course will provide an understanding of concepts and methods in human factors and applications to human-machine system design. We will consider the system design implications of human cognitive and physical capabilities and limitations in perception, memory, decision-making and motor-control. This course will also introduce the students to look at complex system failures from a systems point of view. The culmination of this course will require you to analyze actual accidents based on material learned in class

Course Pre-Requisites / Co-Requisites

None

Course Objectives

- Develop knowledge of human factors and ergonomics (HF/E) terminology and issues in design;
- Learn models of human-machine interaction;
- Develop an understanding of basic human factors research methods;
- Learn human capacities in information processing;
- Develop an understanding of approaches to human-system design and how the principles of human factors can be applied;
- Develop familiarity with a model of human information processing;
- Develop a familiarity with the human factors literature;
- Apply human factors design principles to real-world problems through exercises; and
- Learn outcomes that can be expected from human factors in system design.

Course Materials (e.g., Textbooks, Readings...)

- Lee, J.D., Wickens, C. D., Liu, Y. D. & Boyle, L.N. (2017). Designing for People: An Introduction to Human Factors Engineering (3rd Ed.) ISBN: 978-1539808008.
- Supplemental readings will be provided.

Course Schedule (Tentative)

Week	Date	Topic	Readings and Problem Set Deadlines
1	Thursday, August 21	Syllabus and Course Introduction History of Human Factors	
2	Tuesday, August 26	Human-Machine Systems and Cognitive Engineering	Woods and Roth (1988)
	Thursday, August 28	Task Analysis, Design, and Evaluation Methods	<i>Homework 0 (Getting To Know You!)</i>
3	Tuesday, September 2	Research Methods (Problem set 1 assigned)	
	Thursday, September 4	Human Sensory Systems: Vision	
4	Tuesday, September 9	Human Sensory Systems: Auditory & Somatosensory	
	Thursday, September 11	Visual Search & Signal Detection Theory (Problem set 2 assigned)	Abdi (2007) <i>Problem Set 1</i>
5	Tuesday, September 16	Signal Detection Theory & ROC Curves	
	Thursday, September 18	Cognition and Human Information Processing (Problem set 3 assigned)	<i>Problem Set 2</i>
6	Tuesday, September 23	Cognition and Human Information Processing	Klein et al. (2010)
	Thursday, September 25	Decision Making: Theory, Biases, and Heuristics; Situation Awareness	<i>Problem Set 3</i>
7	Tuesday, September 30	Decision Making: Scheduling and planning, metacognition (Problem set 4 assigned)	
	Thursday, October 2	Displays: Principles of display design, display classification, types of displays	
8	Tuesday, October 7	Displays: Principles of display design, display classification, types of displays (Problem set 5 assigned)	<i>Problem Set 4</i>
	Thursday, October 9	Controls: Principles of control design, Hick-Hyman law, Stability, Open and closed loop systems, Fitts's Law	Fitts (1992; 1954 reprint); MacKenzie (2018)
9	Tuesday, October 14	Human Error Classification	Rasmussen (1983)
	Thursday, October 16	Midterm Review	<i>Problem Set 5</i>
10	Tuesday, October 21	Midterm Exam (8:20 PM – 10:10 PM in LAR 0330)	
	Thursday, October 23	Human-Automation Interaction	Bainbridge (1983)
11	Tuesday, October 28	Human-Automation Interaction	Lee & See (2004)
	Thursday, October 30	Linear and latent failure models	Leveson (2002)
12	Tuesday, November 4	Extensions needed to traditional models	Leveson (2002)
	Thursday, November 6	Normal Accident Theory	Perrow (1999)
13	Tuesday, November 11	Veterans Day (No Class)	
	Thursday, November 13	High Reliability Theory & Team Cognition	Weick (1999)
14	Tuesday, November 18	Resilience Engineering	Woods (2003)
	Thursday, November 20	Course Review: Concept Mapping Activity	
15	Tuesday, November 25	Thanksgiving Break (No Class)	
	Thursday, November 27		
16	Tuesday, December 2	Project Presentations	
	Thursday & Friday (December 4 & 5)	Reading Days	<i>Project Report</i>
17	Wednesday, December 10	Final Exam (8:00 PM – 10:00 PM)	

Grading Scheme – How will I demonstrate my knowledge and be assessed?

Assessment	Base Weights	Oops! I did poorly on the midterm	I froze up on the final	I struggled along the way but nailed the final
Reading Assignments & Problem Sets	15%	15%	15%	10%
Midterm	25%	15%	30%	20%
Project	25%	30%	25%	25%
Final	35%	40%	30%	45%

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Reading Assignments

- Reading assignments must be turned in by midnight (11:59pm) prior to the start of the respective lecture.
- Students are required to submit at least a one page summary of the reading alongside questions and/or interesting thoughts from the reading. Your entries do not need to be long, and point-form is okay. The goal is for you to organize your thoughts and questions about you have learned.
- You are encouraged to reflect on what new concepts that you have learned that especially stood out, and how they apply to your own research interests.
- Please include any questions you may have about the reading.
- Not all the readings in the Course Schedule will be required to submit an assignment. Dr. Atweh will notify the students ahead of time which readings are expected to be analyzed and submitted beforehand. Regardless, you are expected to read all the materials to help you prepare for the exams.

Problem Sets

Problem sets cover material discussed during lectures and from the readings and will help prepare you for the exams. They will be short and consist of true and false, short-answer, and calculation questions. Several problem sets will also be in a “Lab” format to get more experience in human factors tools and techniques. Problem sets must be completed individually. Please submit your completed problem sets online through Canvas.

Project

- Presentation grade is individual and makes up 15% of the grade. The written report is a group grade and makes up 10% of the grade. Modified weights will be divided between the presentation and report equally.

- Peer evaluations will be conducted multiple times during the semester and will cover criteria such as attendance in team meetings, contribution to project concept development, report writing, presentation delivery, and general work ethics.
- **Peer Evaluation grades may bump your grade up or down.** While the proposal and report receive a group grade, the individual grade may be modified based on individual contributions reported in peer evaluations.

Policies we hope never affect you! (late work, team members not contributing)

- Please note that the midterm exam date will be scheduled at the beginning of the semester and announced in advance. This will give you ample time to make arrangements and avoid scheduling conflicts. Students are expected to prioritize this date accordingly.
- If health, religious commitments, disabilities, family emergencies, or UF-sanctioned activities prevent you from turning in work on time, talk to me as soon as you can! I'll work with you. Barring such circumstances, no full credit will be assigned to assignments submitted after the deadline.
- If a group member contributes minimally or not at all on a case, please email or talk to Dr. Atweh.
- We hold the Honor Code in high esteem! If you are caught cheating, your work will receive a zero and you will receive a failing grade in the course. This is separate from any pursuit of an Honor charge.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Coordinator
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

University Academic Policies & Campus Resources

For official academic policies and student support resources, please refer to the University of Florida's syllabus policies: <https://go.ufl.edu/syllabuspolices>. This includes information on attendance, grading, academic integrity, accommodations for students with disabilities, course evaluations, in-class recording policies, library services, and other valuable campus support.