Course Syllabus

Jump to Today

Engineering Psychology I

Spring, 2019

Time: Tuesdays, 1:30-2:45

Location: JS Coon 161

Instructor: Jamie Gorman

Office: JS Coon 128

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Office Hours: By appointment

Course Content

In today's cognitively-demanding work environments, it is often the ability to dynamically integrate cognition *across* humans and machines that leads to safe and effective work: In effective organizations, *the whole is greater than the sum of the parts*. How does the built environment (e.g., layout of controls at a nuclear power plant) inform operator decision making? How might the video screen from an airport baggage screening machine implicitly direct the attention of TSA workers to unexpected objects? How may we extend peoples' cognitive capabilities (e.g., working memory capacity) through the design of a Smartphone interface? At the center of each of these questions, we find a cognitive system comprised of interacting human (neuro-physical and psychological) and built (technological) components. In Engineering Psychology, the realization of effective cognitive systems is the primary domain of inquiry.

Generally speaking, to appreciate cognitive systems it is not enough to understand the details of the human capabilities or the built environment alone. One central theme—one way of thinking about cognitive systems—is that the built environment constrains human capabilities; and vice versa. Because cognition emerges *during* human-environment interaction, the nature of this process is one of dynamic mutual constraint ("mutuality"), which is of great interest to cognitive scientists, ergonomists, and human factors engineers, just to

name a few. In this light, any class of system whose memory, attention, decision making, (etc.) are dynamically assembled across human-environment components falls under the purview of engineering psychology. As engineering psychologists, we shall set out to begin to explore how human capabilities (e.g., cognition) and the built environmental (e.g., technological constraints) interact to achieve an intended goal.

Learning Objectives (LO's)

- Know and understand a sampling of constructs and methods in engineering psychology
- Be able to communicate orally and in writing to human factors practitioners and professionals not proficient in human factors

Course Materials

Readings will be available on Canvas. You will also need to download and email copies of original empirical articles from the GT library. If you do not have access to the library's search engines and e journals, then you will also not have access to Canvas. I.e., you need to have access. You should already have access, assuming you have a GT username and password.

Course Organization

In this course, you will learn primarily through presentations and topical discussions of readings; there will be a new topic each week (see schedule below). Though the course is discussion-based, you should still take notes on the readings and critical points discussed in class; in other words, in addition to what you cover in your readings, be prepared to address discussion and/or critical lecture points on the exams. Therefore, it is imperative that you make known—during class—any concepts in the readings that remain unclear to you (also, these often make for good discussion and/or critical lecture points). The following bulleted list lays out the mechanics of reading assignments and topical discussion.

- A new cluster of readings will be assigned each Thursday, and these will be the topic for the following week.
- You must submit a reaction paper (described later) through Canvas the following Monday by 11:59 pm.
- Unless we have a hands-on activity the following week, two of you will find an empirical article motivated by the topic—you need to show me your article by the following Monday to ensure appropriateness.

- The empirical article will be downloaded and distributed to the rest of the class prior to our next meeting (i.e., the following Tuesday).
- Each Thursday, the students responsible for the empirical paper will lead a PowerPoint presentation discussion of their paper that not only discusses the research but ties it into the concepts of that week's topic (we are shooting for approx. 50 min with 15 min for discussion).

Reaction Papers

A reaction paper is a short (e.g., 3-5 bullets) review/critique of the research area presented in each week's assigned readings. Reaction papers must be submitted through Canvas no later than 11:59pm each Monday. You should also bring your reaction papers to class to spark discussion. Good reaction papers spark discussion or, even better, heated debates during class.

Final Presentation

The purpose of the final presentation is to relate what you have learned in Engineering Psych I to a topic in which you are keenly interested. It will allow you to integrate research that we learned about in this class with your research area of expertise. It may even lead you to ideas for new research.

Components of the presentation include: (1) identify a design problem; (2) conduct a task analysis; (3) discuss the relevant limits and capabilities of human cognition/behavior that are critical for the task; (4) based on literature we have covered, provide guidance/recommendations for improving the design list advantages and disadvantages of the new design; (5) describe a formal experiment to test your design recommendations—state predictions of the different possible outcomes of the experiment and the consequences that each outcome would have for your recommendations; (6) Prepare a 10-minute presentation of #1-5 for class (3 min for questions).

Remember to justify everything you say with data, literature, etc. The topic is flexible, but it must be approved by me at least 1 month before the due date.

Evaluations

Tests (LO #1): The course is roughly divided into two halves. There will be a test after each half (i.e., a midterm and a final). Tests will be take-home and essay-based. Each test is worth 20% of your grade. Tests will be curved, such that someone will make a perfect a grade (100%). Overall, the tests are worth 40% of your grade.

Activities (LO #2): The remaining 60% of your grade comes from the hands-on activities, presentations, and reaction papers. These grades are subjective, but in general, are based on the amount and quality of your contributions. You will be responsible for two presentations (each is 20% of your grade) and four hands-on activities (each is 5% of your grade) this semester. For every reaction paper missed, I will deduct two points from your final grade.

When Bad Things Happen to Good People

Generally speaking, grad students should not miss class, exams, or assignments, especially given the visibility of a low enrollment, discussion-oriented class, but if you have a documented excused absence: (a) All makeup exams will be given during the final exam time at the end of the semester; and (b) there is no mechanism to compensate for a missed presentation/hands-on activity.

Procedures for Providing Accommodations (http://www.adapts.gatech.edu/index.php (http://www.adapts.gatech.edu/index.php))
Any student requesting accommodations as a result of a disability should be referred to the ADAPTS-Disability Services Program. Once referred, the staff in the ADAPTS-Disability Services Program will work with that student to arrange for appropriate accommodations. The student will then receive an accommodation letter detailing their necessary accommodations and should make arrangements to meet with each instructor, bringing with them a letter from the ADAPTS-Disability Services Program detailing the identified accommodations. Should there be any discrepancies with the letter, a call should be placed to the author of the letter.

Plagiarism/Academic Dishonesty

For you to have made it this far, you must either know what plagiarism/academic dishonesty is and how to avoid it, or you are very good at hiding it. See the Georgia Tech Student Honor Code if you have any doubts or ask me before making this career ending mistake.

Course Schedule

Date	Topic	Readings	Activity(ies)
Week 1 1/8	Engineering Psychology Intro	Rogers et al. (2007)	What is Engineering Psychology?
Week 2 1/15	Systems Psychology	Hutchins (1995) Stanton et al. (2006) Gorman (2014)	Systems Presentation
Week 3 1/22	Situation Awareness and Workload	Durso & Gonlund (1999) Wickens Ch. 13 Gorman et al. (2006)	SA/WL Presentation
Week 4 1/29	Human Systems Integration	Boehm-Davis et al. (2015) Gorman et al. (2018)	HSI Presentation
Week 5 2/5	Automation	Parasuraman et al. (2000) Wickens Ch. 16	Automation Presentation
Week 6 2/12	Methods I	Kirwan & Ainsworth Ch. 2 Wickens Ch. 8	Use Methods (Hands On)
Week 7 2/19	Methods II	McDonald et al. (2014) Kirwan & Ainsworth Ch. 3	HTA (Hands On)

Midterm Exam (2/19)	N/A	N/A	N/A
Week 8 2/26	Expertise and Cognitive Task Analysis	Cooke (1999) Clark et al. (2008) Ackerman (2013)	Expertise/CTA Presentation
Week 9 3/5	Error and Safety	Hollnagel (2007) Thomadsen Ch. 23	Error/Safety Presentation
Week 10 3/12	Perception and Attention	Delucia & Levulis (2015) Swets et al. (1999) Wickens (2002)	SDT Demo (Hands On)
Week 11 3/19	Spring Break	N/A	N/A
Week 12 3/26	Cognition	Wickens & Carswell Ch. 5 Durso et al. (2006)	Cognition Presentation
Week 13 4/2	Metacognition and Learning	Dunlosky et al. (2007) Metcalfe (2002)	Metacognition/Learning Presentation
Week 14 4/9	Team Cognition	Cannon-Bowers & Salas (2001) Cooke et al. (2013) Gorman et al. (2017)	Pathfinder/LSA Demos (Hands On)

Week 15 4/16	N/A	N/A	Final Presentations
Week 16 4/23	N/A	N/A	Final Presentations
Final Exam 5/2 @ 2:40	N/A	N/A	Final Presentations

Course Summary:

Date	Details	
Mon Jan 14, 2019	RP 1 (https://gatech.instructure.com/courses/31475/assignments/124800)	due by 11:59pm