PSYC 2270: Engineering Psychology, Fall 2015
Georgia Institute of Technology

Course meeting time	Mon/Wed/Fri 1:05p-1:55p
Course meeting location	Guggenheim room 244
Instructor	Dar-Wei Chen (darwei.chen@gatech.edu)
Office hours	Tue 2p-3p, or by appointment (J.S. Coon building, Room 119)
Teaching assistant	Chris White (cjwhite@gatech.edu)
Office hours	Mon 2p-3p, or by appointment (J.S. Coon building, Room G13)

Course description

Engineering psychology, sometimes referred to as human factors, explores the interactions between humans and technology (e.g. computer interfaces, work spaces, automation). More specifically, engineering psychologists aim to improve user performance, increase satisfaction, and ensure safety. Principles of engineering psychology apply to everyday facets of life such as mobile devices, websites, transportation, household appliances, and road signs.

This course will introduce you to the field of engineering psychology. By the end of the course, you will achieve the learning objectives listed later in the syllabus. Being able to apply your knowledge to technology in the world is important in engineering psychology, and is therefore important in this course. For this reason, most of the course content will be disseminated through readings on your own time, and class time will be used for activities.

When you're in class, you can expect me to be approachable and for the class to have a relaxed atmosphere. I firmly believe that the best learning happens when students are not afraid to ask anything and feel that the classroom is a friendly environment. That being said, I expect that when you are in class, you are paying attention and participating, because that is how the activities are going to be most effective.

Texts

No textbook is required for this course. All readings will be posted on T-Square and/or available for free on the Internet. The readings will come from these sources:

Caldwell, B., Cooper, M., Reid, L. G., & Vanderheiden, G. (2008). Web Content Accessibility Guidelines 2.0. Retrieved from: http://www.w3.org/TR/WCAG20/

Casey, S. (1998). *Set Phasers on Stun*. Santa Barbara: Aegean.

Clinical Human Factors Group. (n.d.). *Human Factors Theory – How errors and incidents occur*. Retrieved from: http://chfg.org/resource/human-factors-theory

Eveleth, R. (2013, September 2). Robots: Is the uncanny valley real? *British Broadcasting Corporation*. Retrieved from: http://www.bbc.com/future/story/20130901-is-the-uncanny-valley-real

Goldstein, E. B. (2010). *Sensation and Perception* (8th ed.). Belmont, CA: Wadsworth.

Griffiths, A. *How Paro the robot seal is being used to help UK dementia patients*. Retrieved from: http://www.theguardian.com/society/2014/jul/08/paro-robot-seal-dementia-patients-nhs-japan

Hsu, J. (2009). *Real Soldiers Love Their Robot Brethren*. Retrieved from: http://www.livescience.com/5432-real-soldiers-love-robot-brethren.html

Kahneman, D. (2011). *Thinking, Fast and Slow*. New York: Farrar, Straus, and Giroux.

Konnikova, M. (2014). *The Hazards of Going on Autopilot*. Retrieved from: http://www.newyorker.com/science/maria-konnikova/hazards-automation

Lobel, T. (2014). *Sensation – The New Science of Physical Intelligence*. New York: Atria.

Nielsen, J. (1995). *10 Usability Heuristics for User Interface Design*. Retrieved from: http://www.nngroup.com/articles/ten-usability-heuristics/

Nielsen, J. (2006). *F-Shaped Pattern For Reading Web Content*. Retrieved from: http://www.nngroup.com/articles/f-shaped-pattern-reading-web-content/

Sawyer, R. J. (2007). Robot Ethics. *Science, 318* (5853), 1037. Doi: 10.1126/science.1151606

Schiller, B. (2015). Yes, Robots Really Are Going To Take Your Job And End The American Dream. Retrieved from: http://www.fastcoexist.com/3046203/the-new-rules-of-work/yes-robots-really-are-going-to-take-your-job-and-end-the-american-drea

Silver, N. (2012). *The signal and the noise: Why so many predictions fail – but some don't*. New York: Penguin Press.

Trochim, W. M. (2006). *The Research Methods Knowledge Base*. Retrieved from: http://www.socialresearchmethods.net/kb/index.php

Wickens, C. D., Lee, J. D., Liu, Y., & Becker, S. G. (2004). *An Introduction to Human Factors Engineering* (2nd ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Learning objectives

General learning objectives: If you complete this course, you will be able to…

- Articulate the importance, on a general level, of designing systems to fit the user
- Analyze a given system, interface, or process, in terms of how it can be improved using engineering psychology principles
- Communicate about engineering psychology issues using the language of the field
- Explain key methods, concepts, and theories of the field
- Design an experiment to evaluate a system, interface, or process
- Use data to draw appropriate conclusions about a system, interface, or process

Content-specific learning objectives: If you complete this course, you will be able to…

- Unit 1: Front-end analysis
  - Use widely-accepted techniques to extract information from an expert
  - Organize extracted information in the form of a task analysis
- Unit 2: Sensation and perception
  - Explain the fundamental concepts of signal detection theory
  - Account for human perceptual abilities/limitations when designing systems/interfaces
- Unit 3: Decision making
  - Discuss factors/biases that can affect a person's decision-making processes
  - Describe the models that have been developed for decision making
- Unit 4: Attention, situation awareness
  - Explain factors that can affect a person's awareness of a situation
  - Explain popular techniques that engineering psychologists use to measure situation awareness
- Unit 5: Displays, interfaces, human-computer interaction
  - Perform a simple usability test
  - Analyze a website in terms of design issues
  - Discuss the government's accessibility requirements for websites
- Unit 6: Automation, human-robot interaction
  - Discuss recent developments and current issues in robotics research
  - Explain the qualities of a good robot design
- Unit 7: Safety, accidents, error
  - Discuss factors that contribute to accidents
  - Explain popular models of accidents

Grading

Grading scale

90+	A
80-89	B
70-79	C
60-69	D
59 or lower	F

Late work

- 20% deducted for each day late
- Arrangements concerning documented excuses will be handled on case-by-case basis

Grade tracker

Date	Item	Points earned	Points possible
Mon, Aug. 24	HW 1: Nate Silver reading		5
Wed, Aug. 26	In-class 1: HTAs for observation, think-aloud		2
Mon, Aug 31	Project 1: Task analysis		5
Wed, Sep. 9	HW 2a: Signal detection theory problems		5
Mon, Sep. 14	HW 2b: Gestalt example		3
Mon, Sep. 21	HW 3: Examples of heuristics/biases		5
Mon, Sep. 28	Project 3: Decision-making		15
Wed, Oct. 7	HW 4: Situation awareness		5
Wed, Oct. 14	In-class 5a: Nielsen heuristics, display org		2
Fri, Oct. 16	In-class 5b: Apple UI guidelines for iOS		3
Wed, Nov. 4	Project 5: Usability test		20
Wed, Nov. 11	In-class 6a: Levels of automation		3
Fri, Nov. 13	In-class 6b: Robotics activity		2
Fri, Nov. 20	HW 7: Timeline workload model		5
Mon, Nov. 23	Project 7: Disaster/accident analysis		15
Fri, Dec. 4	Reflections on class		5
Fri, Dec. 4	Extra credit*		0
	TOTAL		**100**

*Extra credit opportunities:

- Option 1: Participating in School of Psychology research experiments (Sona)
  - 1% extra credit for each hour of participation, maximum of 3% extra credit
- Option 2: Writing research reports
  - Summarize a journal article pertaining to engineering psychology in 350-400 words
  - Parts of the report: Motivation for the research, research question(s), key methods, independent/dependent variables, key results, your interpretation of the results
  - Each report can earn a maximum of 1% extra credit (check-plus = 1%, check = 0.75%, check-minus = 0.5%), maximum of 3% extra credit
- Option 3: Some combination of the above two options, maximum of 3% extra credit

Students with disabilities and/or in need of special accommodations

Georgia Tech complies with the regulations of the Americans with Disabilities Act of 1990 and offers accommodations to students with disabilities. If you are in need of a classroom accommodation, please make an appointment with the ADAPTS Office of Disability Services (http://www.adapts.gatech.edu) to discuss the appropriate procedures.

Academic integrity

You are expected to be familiar with the Georgia Tech Honor Agreement and Code (http://honor.gatech.edu/content/2/the-honor-code) and are bound by it at all times in this course. If you are not familiar with the concept of plagiarism, you are responsible for familiarizing yourself with that as well (you can suffer consequences for plagiarizing, even if you're famous: http://www.politico.com/gallery/2014/07/10-high-profile-plagiarism-cases/001951-027783.html)

Tentative course schedule

Unit	Week	Date		Class topic/activities	Assignments due	Projects due
0	1	Mon	Aug. 17	Syllabus, introductions		
		Wed	Aug. 19	Bad design, HF activities		
		Fri	Aug. 21	Intro reading discussion		
1	2	Mon	Aug. 24	Bad surveys, discuss HW 1	HW 1: Nate Silver reading examples	
		Wed	Aug. 26	Observation, think-aloud	In-class 1: HTA (observation, think-aloud)	
		Fri	Aug. 28	Performance w/ questioning, interview		
2	3	Mon	Aug. 31	Project 1 presentations		Project 1
		Wed	Sept. 2	Psychology of card magic		
		Fri	Sept. 4	Math of signal detection theory		
	4	Mon	Sept. 7	**NO CLASS (Labor Day)**		
		Wed	Sept. 9	Illusions, psychophysical, Gestalt	HW 2a: SDT problems	
		Fri	Sept. 11	Accessibility on phones		
	5	Mon	Sept. 14	Guest lecture: Jonathan Schuett	HW 2b: Gestalt example	
		Wed	Sept. 16	Physical considerations in design		
		Fri	Sept. 18	Heuristics/biases activity		
3	6	Mon	Sept. 21	Discuss Friday, HW 3 examples	HW 3: Examples of heuristics/biases	
		Wed	Sept. 23	Guest lecture: David Illingworth		
		Fri	Sept. 25	Lock-outs, nudges		
	7	Mon	Sept. 28	Project 3 presentations		Project 3
4		Wed	Sept. 30	Guest lecture: Thomas Gable		
		Fri	Oct. 2	Assessing SA, multiple-resource theory		
	8	Mon	Oct. 5	Change blindness		
5		Wed	Oct. 7	Usability tests	HW 4: Situation awareness	
		Fri	Oct. 9	**NO CLASS (Fall Break)**		
	9	Mon	Oct. 12	**NO CLASS (Fall Break)**		
		Wed	Oct. 14	Display organization	In-class 5a: Nielsen heuristics, display org	
		Fri	Oct. 16	Design guidelines activity	In-class 5b: Apple UI guidelines for iOS	
	10	Mon	Oct. 19	Project 5 data collection		
		Wed	Oct. 21	Project 5 data collection		
		Fri	Oct. 23	Guest lecture: Vincent Martin		
	11	Mon	Oct. 26	**NO CLASS (conference)**		
		Wed	Oct. 28	**NO CLASS (conference)**		
		Fri	Oct. 30	**NO CLASS (conference)**		
	12	Mon	Nov. 2	Project 5 workday		
		Wed	Nov. 4	Project 5 presentations		Project 5
6		Fri	Nov. 6	Ethics discussion about robots		
	13	Mon	Nov. 9	Guest lecture: Sean McGlynn		
		Wed	Nov. 11	Levels of automation, out of the loop	In-class 6a: Levels of automation	
		Fri	Nov. 13	Robotics activity	In-class 6b: Robotics activity	
7	14	Mon	Nov. 16	Analyzing the Challenger disaster		
		Wed	Nov. 18	Human error		
		Fri	Nov. 20	Project workday	HW 7: Timeline workload model	
	15	Mon	Nov. 23	Project 7 presentations		Project 7
		Wed	Nov. 25	**NO CLASS (Thanksgiving)**		
		Fri	Nov. 27	**NO CLASS (Thanksgiving)**		
	16 Dead Week	Mon	Nov. 30	To be decided		
		Wed	Dec. 2	To be decided		
		Fri	Dec. 4	To be decided	Reflections on class	