IE/PSY 57700: Human Factors in Engineering
CRN: 14190 (IE), 14114 (PSY)
Fall, 2022: 2:30 pm - 3:20 pm MWF
Grissom Hall 103
Instructional Modality: Face-to-Face
Credits: 3

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Office Hours: MW 8:00 a.m.- 9:00 a.m.
and by appointment
Zoom Meeting Room: https://purdue-edu.zoom.us/j/6996376418

Course Description:

Survey of human factors in engineering with particular reference to human functions in human-machine systems, and consideration of human abilities and limitations in relation to design of equipment and work environments. The systems include interactions with computers, robots, automated vehicles, and so on. We consider basic human capabilities and the ways that these capabilities are considered in the design of human-machine systems and work environments.

Learning Objective and Outcomes:

The goal of the course is for you to acquire the fundamental knowledge and skills of Human Factors and Ergonomics to be able to identify design issues, potential solutions, and how to evaluate those solutions. By the end of this course, you should be able to demonstrate this knowledge of the main topics, including:

-- how the field of Human Factors developed;
-- the principles, assumptions, and methods on which the field of Human Factors is based;
-- scientific and probabilistic thinking and their roles in Human Factors;
-- the systems engineering approach and its implications for Human Factors;
-- types of human error and the factors that influence their likelihood;
-- facts and theories regarding human perception, cognition, and action and their implications for design;
-- physical and environmental factors that need to be considered when designing for human use;
-- specific methods such as those for assessing mental workload and situation awareness for alternative designs;
-- steps for implementing human factors and ergonomics programs within organizations;
-- why Human Factors is more important than ever in today's technologically driven society.

You should be able to answer questions on exams and homework assignments about why human factors analyses are needed and what types of factors must be considered for specific design problems. You also should be able to solve problems with, and show knowledge of, some of the available techniques for making informed choices among alternative designs.

Recommended Procedure:

(1) Read the assigned material from the course outline before the class for which it is assigned.
(2) Be engaged: Think about how the concepts and principles we cover relate to stories in the news and your everyday life.
(3) If you have questions pertaining to homework, you should consult with a teaching assistant first.

Learning Resources, Technology & Texts

- *Required Textbook:*
  The text for the course is the 3rd edition of R. W. Proctor & T. Van Zandt (2018), *Human Factors in Simple and Complex Systems*. Boca Raton, FL: CRC Press.

  We will read approximately 1-1.5 chapters of the textbook each week (following the schedule below), and lectures will expand on and explain material on the assigned chapter topics.

- *Additional Readings:*
  Additional readings will be assigned as part of the homework. They will be short articles, news items, or pamphlets related to course topics. They will be posted on Brightspace with the homework assignment

- *TA support:*
  There are three TAs for the course. The TAs' main role is to be prepared to assist you with questions regarding the homework, although they also can answer questions about the class content and exams.

  Qi Zhong
  Ashley Warren
  Mohak Gupta

- *Brightspace learning management system (LMS)*
  Access the course via Purdue's Brightspace learning management system. Begin with the Start Here tab, which describes how the course Brightspace is organized. It is strongly suggested that you explore and become familiar not only with the site navigation but with content and resources available for this course. See the Student Services widget on the campus homepage for resources such as Technology Help, Academic Help, Campus Resources, and Protect Purdue.

Course Web Site: https://purdue.brightspace.com/d2l/home

The syllabus, office hours, course slides, homework assignments, and additional course information will be posted at the course Web site on Brightspace. To access these materials, you must:

Log on to Brightspace by entering your CAREER account username and password.
Select the course Fall 2022 IE/PSY 57700 - Merge.

Lectures will be given in Grissom Hall 103 from 2:30 pm to 3:20 pm (MWF).

Assignments:

Your learning will be assessed through homework projects and four exams spread throughout the academic period. Details on these assignments and exams, including due dates will be posted on the course website.

Assignments	Due	Points
Homework Projects	Typically assigned on Friday; 9 projects, 10 points each, drop lowest	80
Exam 1	Sept. 16	80
Exam 2	Oct. 14	80
Exam 3	Nov. 4	80
Final Exam	Scheduled date	80
		Total: 400

In addition, 5 points extra credit will be given for filling out a survey the first week of class, "Initial Information Relating to IE/PSY 57700."

Homework Projects:

Homework projects will be assigned on Friday. Most will be due a week later. The projects should be prepared individually by each student, unless otherwise indicated, and not copied from someone else. The projects are modified and updated each semester; copied projects or ones using numbers from a prior semester will not receive credit and may be subject to stronger penalty (see Academic Honesty, below). The cumulative grade for the projects will be the equivalent of an exam grade (80 points).

Exams and Course Grading Scale:

Four exams will be held, each covering approximately 1/4 of the course. **Exams 1-3 will be held in the classroom during the class period** on the designated days. Exam 4 will be the final examination, which will not be comprehensive but may include a few general questions. The exams will be a mix of multiple-choice and short-answer questions, with limited time for taking them. The exam grades may be curved, depending on overall class performance. The course grade will be determined from the four exam grades and the homework projects grade, each of which will be worth 20%. Because the curves will be on the individual exams, the planned cutoffs for the grades will be on a scale of 90%, 80%, etc., of the total points, which will be cutoffs of 360 for A, 320 for B, 280 for C, and 240 for D. There is a possibility that the cutoffs will be lower if I decide that results in a more appropriate grade distribution. Finally, I give plus or minus grades only in the cases of individuals who are close to a cutoff and have been diligent in their homework assignments.

Attendance Policy:

This course follows Purdue's academic regulations regarding attendance, which states that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance is not required, but the classes will focus on clarifications and examples of concepts and methods covered in the text, including material that is not in it or the slides. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to the instructor is not possible, the student should contact the instructor as soon as possible by email. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases falling under excused absence regulations, the student or the student's representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent or urgent care medical care.

Academic Guidance in the Event a Student is Quarantined/Isolated:

If you must miss class at any point in time during the semester, please reach out to me via Purdue email so that we can communicate about how you can maintain your academic progress. For COVID-19 concerns, please see the **Fall 2022: What you need to know guidance** published July 27. If you find yourself too sick to progress in the course, notify your adviser and notify me via email or Brightspace. We will make arrangements based on your particular situation.

Classroom Guidance Regarding Protect Purdue:

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights and the Violent Behavior Policy under University Resources in Brightspace.

Academic Integrity:

Academic integrity is one of the highest values that Purdue University holds. Consistent with the provision of the Purdue University Bill of Student Rights (as proposed by the Board of Trustees, July 13, 1978) and the

University Regulations Governing Student Conduct, Disciplinary Proceedings and Appeals (as passed by the Board of Trustees, July 24, 1978), the following policy regarding academic integrity will apply to the course. **All exams and homework assignments are designated as individual effort only (unless specified otherwise).** Dishonesty in these areas will result in failure for the quiz or exam and will most likely subject the student to failure in the course. A student who assists in any form of dishonesty is equally as guilty as the student who accepts such assistance.

Notes are "considered to be 'derivative works' of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials. As such, notes or any other materials from this course cannot be sold or bartered without the instructor's express written permission.

Nondiscrimination Statement:

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. More details are available on our course Brightspace table of contents, under University Policies.

Accessibility:

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247. More details are available on our course Brightspace under Accessibility Information.

Mental Health Statement:

If you find yourself feeling some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack, https://purdue.welltrack.com/. Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center during business hours. The CAPS website also offers resources specific to situations such as COVID-19.

Basic Needs Security:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it relates to COVID-19, students may submit requests for emergency assistance from the Critical Need Fund

Emergency Preparation:

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

TENTATIVE SCHEDULE

Session	Topic	Reading Assignment
Session 1 (Aug. 22)	Human Factors in Engineering	
Session 2 (Aug. 24)	Basic Concepts & Historical Foundations	Chapter 1
Session 3 (Aug. 26)	Reliance on the Scientific Method	Chapter 2
Session 4 (Aug. 29)	Fundamentals of Research Design	Chapter 2
Session 5 (Aug. 31)	Fundamentals of Probability & Statistics	Chapter 2
Session 6 (Sept. 2)	System Concept and Human Error	Chapter 3
LABOR DAY (09/05)		
Session 7 (Sept. 7)	Human Reliability Analysis	Chapter 3
Session 8 (Sept. 9)	Human Information Processing/Psychophysical Methods	Chapter 4
Session 9 (Sept. 12)	Signal Detection Theory	Chapter 4
Session 10 (Sept. 14)	Chronometric and Neuroscience Methods	Chapter 4
Session 11 (Sept. 16)	**EXAM 1 (Chapters 1-4)**	
Session 12 (Sept. 19)	Perceptual Factors & Their Application: Vision	Chapter 5
Session 13 (Sept. 21)	Visual Perception	Chapter 5
Session 14 (Sept. 23)	Color Vision & Perceptual Organization	Chapter 6
Session 15 (Sept. 26)	Depth Perception	Chapter 6
Session 16 (Sept. 28)	Motion Perception & Pattern Recognition; Review	Chapter 6
Session 17 (Sept. 30)	Audition and the Other Senses	Chapter 7
Session 18 (Oct. 3)	Static Visual Displays	Chapter 8
Session 19 (Oct. 5)	Warning Lights and Dynamic Visual Displays	Chapter 8
Session 20 (Oct. 7)	Auditory and Tactual Displays	Chapter 8
OCTOBER BREAK (10/10-10/11)		
Session 21 (Oct. 12)	Attention	Chapter 9
Session 22 (Oct. 14)	**Exam 2 (Chapters 5-8)**	
Session 23 (Oct. 17)	Attention and Mental Workload	Chapter 9
Session 24 (Oct. 19)	Memory Stores and Working Memory	Chapter 10
Session 25 (Oct. 21)	Long-Term Memory and Comprehension	Chapter 10
Session 26 (Oct. 24)	Situation Awareness	Chapter 10
Session 27 (Oct. 26)	Problem Solving and Reasoning	Chapter 11
Session 28 (Oct. 28)	Decision Making and Decision Aids	Chapter 11

Session 29 (Oct. 31)	Skill Acquisition and Expertise	Chapter 12
Session 30 (Nov. 2)	Naturalistic Decision Making & Expert Systems	Chapter 12
Session 31 (Nov. 4)	**Exam 3 (Chapters 9-12)**	
Session 32 (Nov. 7)	Response Selection and Principles of Compatibility	Chapter 13
Session 33 (Nov. 9)	Population Stereotypes and Dual-Task Performance	Chapter 13
Session 34 (Nov. 11)	Human Motor Control	Chapter 14
Session 35 (Nov. 14)	Acquisition and Retention of Motor Skill	Chapter 14
Session 36 (Nov. 16)	Types of Controls and Their Features	Chapter 15
Session 37 (Nov. 18)	Control Panels	Chapter 15
Session 38 (Nov. 21)	Engineering Anthropometry & Workspace Design	Chapter 16
	THANKSGIVING BREAK (11/23-11/26)	
Session 39 (Nov. 28)	Manual Materials Handling, Cum. Trauma Disorders	Chapter 16
Session 40 (Nov. 30)	Environmental Ergonomics: Lighting and Noise	Chapter 17
Session 41 (Dec. 2)	Temperature and Air Quality; Stress	Chapter 17
Session 42 (Dec. 5)	Macroergonomics	Chapter 18
Session 43 (Dec. 7)	Teaming with Humans & Automation	Chapter 18
Session 44 (Dec. 9)	The Practice of Human Factors	Chapter 19
	FINAL EXAM (Chapters 13-19) – Date to be announced	