# Human Factors in Systems Design
EIN 6905
***Class Periods and Location:***
Tuesday | Period 4 (10:40 AM - 11:30 AM) CSE E107
Thursday | Period 4 - 5 (10:40 AM - 12:35 PM) CSE E107
***Academic Term:*** Spring 2019
***Last Updated:*** Jan 7, 2019

***Instructor:***
Wayne Giang, PhD
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Office Hours:   3-5pm W; or by appointment

## Course Description
This course (3 credit hours) 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.

## 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-systems 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 systems design.

## Required Textbooks and Software
- 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 (Required).
- Supplemental readings will be provided.

## Course Schedule
**Course Schedule**

| Week | Date | Lecture Number | Topic | Readings and Problem Sets |
|---|---|---|---|---|
| 1 | T 1/8 | 1 | **Course Introduction** | Ch 1 |
|  | R 1/10 | 2 | **Introduction and history** of human factors. | Ch 1 |
| 2 | T 1/15 | 3 | **Research methods**: Introduction and methods. | Ch 2 |
|  | R 1/17 | 4 | **Research methods**: Analytic and design methods. | Ch 2 |
| 3 | T 1/22 | 5 | **Research methods**: Evaluative methods. | Ch 3 |
|  | R 1/24 | 6 | **Research methods**: Experiment design. **(Problem set 1 assigned.)** | Ch 3 |
| 4 | T 1/29 | 7 | **Human sensory systems**: Vision. | Ch 4, Ch 5 |
|  | R 1/31 | 8 | **Human sensory systems**: Hearing. | Ch 4, Ch 5 **Problem set 1** |

| 5 | T 2/5 | - | **Human sensory systems**: Other systems and psychophysics. **(Problem set 2 assigned.)** | Ch 4, Ch 5 Supplementary reading |
|---|---|---|---|---|
|  | R 2/7 | - | Review and practice problems. | - |
| 6 | T 2/12 | 9 | **Midterm Exam 1** |  |
|  | R 2/14 | 10 | **Perception to detection**: Signal detection theory. | Ch 4, Ch 5 Supplementary reading **Problem set 2** |
| 7 | T 2/19 | 11 | **Perception to detection**: Receiver operating characteristic curves (practice problems). **(Problem set 3 assigned.)** | Supplementary reading |
|  | R 2/21 | 12 | **Cognition and Human information processing (HIP):** Memory and attention | Ch 6 |
| 8 | T 2/26 |  | **Cognition and HIP:** Action | Ch 6 **Problem set 3** |
|  | R 2/28 | 13 | **Decision-making:** Frameworks for study, level of control, biases and heuristics, human judgement (Brunswick lens model) **(Assignment 1 assigned.)** | Ch 7 |
| 9 | T 3/5 | - | No class – Spring break | - |
|  | R 3/7 | - | No class – Spring break | - |
| 10 | T 3/12 | 14 | **Decision-making:** Situational awareness, problem solving and diagnostics, scheduling and planning | Ch 7 |
|  | R 3/14 | 15 | **Display and control**: classifications, principles of display design, controls and inputs | Ch 8, Ch 9 |
| 11 | T 3/19 | 16 | **Display and control**: visual scanning, proximity compatibility principle, Hick-Hyman law. | Ch 8, Ch 9 |
|  | R 3/21 | - | Review and practice problems. | **Assignment 1** |
| 12 | T 3/26 | - | **Midterm Exam 2** | - |
|  | R 3/28 | 17 | **Human motor performance**: Motor control theory, Fitts' Law revisited. **(Assignment 2 assigned.)** | Chp 9, Fitts 1992 (1954 reprint); MacKenzie & Teather (2012) |
| 13 | T 4/2 | 18 | **Safety and accident prevention:** Safety culture, error classification | Ch 16 |
|  | R 4/4 | 19 | **Macrocognition and organization factors:** Social factors, work organizations, and personnel selection and training | Ch 17, Ch 18; |
| 14 | T 4/9 | 20 | **Human-computer interaction** | Ch 10 |
|  | R 4/11 | 21 | **Interfaces for complex systems** | Supplemental reading |
| 15 | T 4/16 | 22 | **Automation and autonomous systems** | Ch 11 |
|  | R 4/18 | 23 | **Transportation human factors** | Supplemental reading |
| 16 | T 4/23 | 24 | Review and practice problems. | **Assignment 2** |
|  |  |  |  |  |
| Finals | R 5/2 | - | **Final Exam** | - |

*Evaluation of Grades*

| Assignments | Points |
|---|---|
| Problem sets (3 @ 25 each) | 75 |
| Assignments (2 @ 75 each) | 150 |
| Post-class diary + In-class participation | 50 |
| Midterm exam 1 | 50 |
| Midterm exam 2 | 50 |
| Final exam | 125 |
| Total points possible | 500 |

*Grading Policy*

| Percent | Grade | Grade Points |
|---|---|---|
| 90.0 - 100.0 | A | 4.00 |
| 87.0 - 89.9 | A- | 3.67 |
| 84.0 - 86.9 | B+ | 3.33 |
| 81.0 – 83.9 | B | 3.00 |
| 78.0 - 80.9 | B- | 2.67 |
| 75.0 - 79.9 | C+ | 2.33 |
| 72.0 – 74.9 | C | 2.00 |
| 69.0 - 71.9 | C- | 1.67 |
| 66.0 - 68.9 | D+ | 1.33 |
| 63.0 - 65.9 | D | 1.00 |
| 60.0 - 62.9 | D- | 0.67 |
| 0 - 59.9 | E | 0.00 |

More information on UF grading policy may be found at:
http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades

### Attendance Policy and Class Expectations

It is important to complete the required readings before your class in order to fully benefit from the class activities. Teaching and learning is a shared responsibility, influenced by individual knowledge and experience, and achieved through expanding our awareness of the different issues and approaches involved in human factors and ergonomics. Commitment, preparation, and active participation are important ingredients to realize this goal. Your preparation and participation is important to your learning and the learning of your colleagues. As such, you should attend and participate in every class.

### Make-Up and Regrade Policy

In the case of a series illness or emergency that will result in you missing an exam, please contact the instructor by e-mail as soon as possible. Please provide a written explanation for the missed exam accompanied by a doctor's note, an accident report, or any other relevant documentation. If there is a legitimate emergency or illness then you will either be given a make-up exam within one week of the original exam date, or the final exam score will be substituted for the missing exam score. The choice is left to the instructor.

Please submit all requests for regrading in writing to the instructor within one week of receiving the grade. Late requests will not be accepted. Be as specific as possible about the issue that needs to be addressed in your request; generic requests for regrading the entire assignment or exam will not be accepted. Please be aware that regrades may result in both increases and decreases in your grade as we will regrade the entire component in question.

### Assignment Policy

Please make every effort to meet the assignment and problem set deadlines. If you absolutely require an extension, please send the instructor a request with the following information: (i) reason for extension, (ii) current status of the assignment, and (iii) due date requested. If an extension is granted, you must include correspondence regarding the request and the reply with your assignment. In the absence of an extension, late assignments will be accepted for 24 hours after the due date with a 25% deduction.

### Communication Policy

Please do not email course content questions directly to the instructor. If you have a question, there is a good chance other people in the course have the same question or, at least, will benefit from the answer. Please post all questions

related to course content on E-Learning using the questions discussion board so that everyone in the course can benefit from your questions and the replies. Alternatively, you may include the questions in your lecture learning diary. Questions posted to question discussion board will be answered within two (2) business days.

### Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

### University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

### Commitment to a safe and inclusive learning environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination.

It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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 Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@ufl.edu

### Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

*Campus Resources:*

*Health and Wellness*

**U Matter, We Care:**
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Assault Recovery Services (SARS)**
Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

*Academic Resources*

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

**Career Resource Center**, Reitz Union, 392-1601.  Career assistance and counseling. https://www.crc.ufl.edu/.

**Library Support**, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

**Student Complaints Campus***: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

**On-Line Students Complaints***: http://www.distance.ufl.edu/student-complaint-process.