

## **Human Factors and Ergonomics I**

**EIN3241**

**Class Periods:** T 3 (9:35 AM - 10:25 AM), R 3-4 (9:35 AM - 11:30 AM)

**Location:** TBD

**Academic Term:** Spring 2021

### ***Instructor:***

Sanaz Motamedi

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Office Phone Number: 352-297-7724

Office Hours: TBD

### ***Teaching Assistants:***

TDB

### ***Course Description***

Introduces the techniques and concepts necessary to understand users and workplace requirements as they apply to the design of sociotechnical systems. Topics covered include methods to measure and understand work (work measurement), human cognitive and physical capabilities and limitations, and workplace requirements. Applications for design, including computer displays, noise, hand-eye coordination, as well as repetitive and high physical effort tasks are presented.

### ***Course Pre-Requisite***

Statics (EGM2511)

### ***Course Objectives***

At the conclusion of this course, students will be able to:

- Describe the meaning and importance of human factors and ergonomics
- Relate human sensory, cognitive, and physical capabilities and limitations to the design of human-machine systems
- Select and correctly use appropriate work measurement, human-machine system analysis, and design tools
- Apply human-machine system design principles to real-world problems through exercises

### ***Materials and Supply Fees***

None

### ***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.

### ***Professional Component (ABET):***

This course supports the ISE undergraduate program educational objectives of producing graduates who

- “will be successful professionals using industrial and systems engineering skills”,
- “can acquire advanced knowledge through continuing education or advanced degree programs”
- “can become active leaders in their profession and/or community”

**Relation to Program Outcomes (ABET):**

<b>Outcome</b>	<b>Coverage*</b>
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	High
3. An ability to communicate effectively with a range of audiences	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Medium
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

**Attendance Policy, Class Expectations, and Make-Up Policy**

I will make every effort to maintain an atmosphere in the class that is conducive to learning.

**Noise:** To ensure a classroom environment conducive to success for everyone, please silence cell phones before class starts. I will not tolerate talking during the class. Repeating offenders will be asked to leave the classroom.

**Disruptions:** Please make an effort to arrive to class on time. If you must enter the classroom late, be considerate and be as quiet as possible. Refrain from leaving early. If you need to do so, be as quiet as possible. I will not tolerate students sleeping in the class, being disruptive or working on something different from the class.

**Participation:** Although you will not receive credit for it, participation in class is highly recommended. It will make the learning experience better and more enjoyable for everybody. Examples of a positive contribution to the class include asking questions that clarify any confusion you might be experiencing, constructively challenging the assumptions of a model, communicating your opinion about an open problem or sharing your personal experience. Examples of a negative contribution to the class include trying to slow down the class with irrelevant questions or making other students feel "stupid".

Individuals whose behavior is detrimental to a good class atmosphere will be notified. Persistent disruptive behavior will result in grade deductions.

**Make-up Policy:**

Excused absences are consistent with university policies in the undergraduate catalog

(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

### Course Schedule

Week	Topic	Readings and Problem Sets
1	Introduction to Human Factors and Ergonomics and User Centered Design	Ch 1
	Introduction to Human Factors and Ergonomics and User Centered Design	
2	Work Measurement: Work sampling introduction	Supplemental Material
	Work Measurement: Work sampling methods and techniques lab	
3	Work Measurement: Time study introduction	Supplemental Material
	Work Measurement: Time study methods and techniques lab	
4	Work Measurement: Pre-determined time systems – MTM and MOST	Supplemental Material
	Work Measurement: Pre-determined time systems – MTM and MOST	
5	Usability Basics: User requirements	Ch 2, 10
	<b>Exam 1</b>	
6	Usability Basics: Requirements gathering and task analysis	Ch 2, 10
	Usability Basics: Evaluation and prototyping	
7	Cognitive Ergonomics: Human-action cycle and human error	Ch 6, 8, 9, 10
	Cognitive Ergonomics: Human information processing – perception and attention	
8	Cognitive Ergonomics: Human information processing - memory	Ch 6, 8, 9, 10
	Cognitive Ergonomics: Decision-making introduction	
9	Cognitive Ergonomics: Decision-making – heuristics and biases	Ch 6, 8, 9, 10
	Cognitive Ergonomics: Team work and communication	
10	<b>Project Presentation</b>	
	<b>Exam 2</b>	
11	Physical Ergonomics: Anthropometry	Ch 12, 13
	Physical Ergonomics: Anthropometry and muscular system	
12	Physical Ergonomics: Muscular system	Ch 12, 13
	Physical Ergonomics: Cumulative trauma disorders	
13	Physical Ergonomics: Workstation design	Ch 12, 13
	Physical Ergonomics: Workstation design and hand-tool design	
14	Physical Ergonomics: Hand-tool design	Ch 12, 13
	Internal and External Environmental Factors: safety culture and accident prevention	
15	Internal and External Environmental Factors: Stress, workload, safety culture and accident prevention	Ch 15, 16
	<b>Project Presentation</b>	
<b>Finals</b>	<b>Final Exam</b>	<b>Cumulative</b>

### ***Evaluation of Grades***

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Exams (2)	120	30%
Final	80	20%
Homework	80	20%
Projects (2)	120	30%
	400	100%

### ***Projects***

For this course, you will deliver two projects. The first project's focus is on analyzing a cognitive task using work sampling and concepts and methods from cognitive ergonomics. The second project's focus is on analyzing a physical task using time and motion studies and concepts and methods from physical ergonomics. These projects will encourage you to demonstrate your knowledge of the concepts learned in the classroom. During these projects, you have opportunity to formulate, analyze and solve a practical problem originating from industry or other professional settings. There will be 2 deliverables for these projects: 1) final report, and 2) presentation.

### ***Grading Policy***

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
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

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***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 professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-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.

### **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](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### **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.

### **Campus Resources:**

#### **Health and Wellness**

#### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**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 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](mailto:title-ix@ufl.edu)

#### **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://care.dso.ufl.edu>.

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

## ***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: <https://registrar.ufl.edu/ferpa.html>