

## **IE/EM 580 – Introduction to Ergonomics and Human Factors**

University of Louisville  
Department of Industrial Engineering  
Fall 2009

**Course Catalog Description:** Quantitative assessment of human performance capabilities and limitations to the planning, design, development, management and evaluation of complex human-machine/industrial systems.

**Credits:** 3

**Schedule:** T & TH, 9:30-10:45 in SH001 on the Belknap Campus

**Instructor:** Dr. G.T. Holman, Assistant Professor of Industrial Engineering  
Director, Center for Industrial Ergonomics  
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**Office Hours:** T & TH, 8:15-9:30 or by appointment

**GTA:** David Burnett

### **Course Materials:**

~~Textbook 1:~~ Wickens, C.D., Lee, J.D., Liu, Y., and Gordon Becker, S.E. (2004). *An introduction to human factors, 2<sup>nd</sup> Edition*. Pearson Education, Inc., Upper Saddle River, New Jersey, USA. ISBN 0-13-183736-2

~~Textbook 2:~~ Floyd, R.T. & Thompson, C.W. (1998) *Manual of Structural Kinesiology*, 13<sup>th</sup> Edition, WCB/McGraw-Hill, USA. ISBN 0-8151-4630-2

~~Textbook 3:~~ Reference Manual on Technical Writing & APA style

Other Materials will be provided during the course progression

**Course Website:** U of L Blackboard &  
<http://www.facultyzoo.com/holman/index.htm>

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### **Statement for Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs each semester. Hence, a letter of verification for approved accommodations must be obtained and delivered to the instructor as early in the semester as possible.

### **Statement on Academic Integrity**

U of L seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others, as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Helping or attempting to commit an act of academically dishonest will be handled based on University guidelines. For more information, consult The Code of Student Conduct, <http://louisville.edu/graduatecatalog/2008-2009-update/gen/code-of-student-conduct>.

**Student's Roles and Responsibilities**

- **Participate in class** discussions, contribute individual experiences when relevant to the topic so that others can benefit and learn
- **Ask questions**...there are no dumb/bad question if you learned something from the response
- **Respect** your others opinions and point of view
- **Cell Phones should be turned off** at the beginning of class unless you are emergency personnel on-call. Activation or use of a cell phone will be penalized.
- Take **individual responsibility** for completing assignments on time.
- **Participate in all team-related** activities, homeworks, presentations and report writings
- **Check e-mail** and Blackboard frequently (just not in class)

**Class Attendance:** I do not take attendance, but it is **VERY STRONGLY** encouraged since much of the material presented in the lectures and class discussion is not otherwise available in the texts, PowerPoints, and/or reading assignments.

**Quizzes:** A quiz will be given in the first 5 minutes of at least half the classes taught this semester.

**Homework:** Assignments may be given in place of quizzes. Homework will be collected in the first 5 minutes of class on the due date.

**Exams:** Exams will be given in class. Make-up exams will be giving on a case by case basis. Makeup exam's time, content, and method of testing are at the instructor's discretion.

**Labs:** Laboratory exercises are a group activity consisting of no more than 4 members. There will be two laboratory exercises during the semester (tentative, subject to change). See schedule for dates.

**Lab Reports:** Laboratory reports will be written as a technical document using proper spelling and grammar (i.e. technical writing). The structure will be done in American Psychological Association (APA) format. Reports should be typed in 12 point font. These will be graded criteria. See reference manual.

**Project:** The individual project will be one of your own design. However, the project topic and design must be approved. Deadline for topic approval is the class oral presentation proposal. Expectations are that the project is representative of the knowledge, tools, and techniques obtained in this course. To govern these criteria, the final section in the report appendix should be a submission application to a technical conference for a poster or presentation session.

CONFERENCES:      Human Factors and Ergonomics Society (HFES)  
                          American Society of Safety Engineers (ASSE)  
                          Institute of Industrial Engineers (IIE)  
                          Applied Ergonomics Conference and Expo  
                          \*\*Conference of area/discipline of application

APPLICATION AREAS:      Healthcare, Manufacturing, Service, etc.  
                          Productivity, Simulation, Optimization, Safety, etc.

TO HELP WITH IDEAS:      Bad Designs: <http://www.baddesigns.com/>

**Project Collaborations:** Student enrolled in the class may collaborate together on projects. Multidisciplinary projects are **HIGHLY** valued and rewarded. University faculty may also be utilized, who are relative to the area of application. All collaborators should be recognized.

**Project Reports (required):** Reports will be written as a technical document using proper spelling and grammar (i.e. technical writing). The structure will be done in American Psychological Association (APA) format. Reports should be typed in style of conference of submission, else 12 point font. The report will be worth a minimum of 50% of the total project points. See reference manual. Report submission is due on the date and time of the final presentation and includes two parts:

IN CLASS: a hard copy of the report, plus 2 additional copies of the abstract

ELETRONIC: a copy of the report word document & all presentation materials

**Project Posters & Presentations:** The last week of class will be presentation week. Individuals choosing to do a "presentation" will be assigned 15 minute time slot for a PowerPoint presentation. Individuals choosing to do a poster session will be given 3-5 minutes in a gallery format for inductions (self, topic, application, findings). After, poster presenters will stand by their posters to field questions from faculty, staff, and students. Posters are to be submitted with the end of the gallery session.

**Submitting Work:** To ensure that all student work is handled efficiently and quickly, the header of all submitted work (unless otherwise stated) should have the following information. Failure to comply will result in a onetime warning; subsequent violations will result in a 10% penalty.

- Student Name (Last, First)
- IE 580
- Name of Work (e.g. Assignment 1)
- Date of Submission

**Late Submissions:** Work received after the due date and time will result in a 10% penalty for everyday it is late. Work must be received by a person (instructor, TA, etc.) unless otherwise specified.

**Extra Credit/\*\*Bonus:** No extra credit is given during semester.

**Evaluation of Student Performance:** Final grade will be given out on a point system. To figure the points needed for your desired grade, multiply the letter grade percentage by the total points accumulated. Below are the approximate point values for the grading criteria and the grade scale.

<u>Item</u>	<u>Points</u>	<u>Letter Grade</u>	<u>Percentage</u>
Homework & Quizzes	200	A	90.0% ~ 100%
Lab (x2)	200	B	80.0% ~ 89.9%
Project	200	C	70.0% ~ 79.9%
Midterm	200	D	60.0% ~ 69.9%
Final	200	F	Below 60.0%

**NOTE:** Labs, project, and posters will be collect and not returned. Students should keep a copy of all submitted or presented work.

**Tentative Schedule**

<u>Date</u>	<u>Topic</u>	<u>Assigned reading</u>
Aug 25	Syllabus & Expectations; Intro to Ergonomics, Human Factors, & Research	Ch 1, 2 of Wickens et al.
Aug 27	Anatomy: Overview of Systems, Neuromuscular System, Nervous System	
Sept 1	Anatomy: Metabolism & Energy, Cardiovascular System, O <sub>2</sub> Transport	
Sept 3	Anatomy: Respiratory System	
Sept 8	Anatomy: Skeletal System & associated muscle groups	Ch 1, 10 of Thompson & Floyd
Sept 10	Anatomy: Skeletal System & associated muscle groups	Ch 2, 3, 4, 5 of Thompson & Floyd
Sept 15	Anatomy: Skeletal System & associated muscle groups	Ch 7, 8, 9 of Thompson & Floyd
Sept 17	Ergonomics: Anthropometry	Ch 10 of Wickens et al.
Sept 22	Ergonomics: Biomechanics	Ch 11 of Wickens et al.
Sept 24	Ergonomics: Biomechanics, MMH, Musculoskeletal Disorders	Ch 11 of Wickens et al.
Sept 29	Ergonomics: Work Physiology	Ch 12 of Wickens et al.
Oct 1	Ergonomic Tools for Evaluation	
Oct 6	Lab 1: Ergonomics of Functional Layout and Design	Reference Manual
TBA	Midterm Review	
Oct 8	Midterm Exam	
Oct 13	Midterm Break	
Oct 15	Human Factors: Vision	Ch 4 of Wickens et al.
Oct 20	Human Factors: Audio, Tactile, Vestibular <b><i>"last day to drop"</i></b>	Ch 5 of Wickens et al.
Oct 22	(no class) Term Project data collect	
Oct 27	Human Factors: Cognition	Ch 6 of Wickens et al.
Oct 29	Human Factors: Stress & Workload	Ch 13 of Wickens et al.
Nov 1	Human Factors: Decision Making	Ch 7 of Wickens et al.
Nov 3	(no class) <b><i>"Daylight Savings Time, set clock 1 hour back"</i></b>	
Nov 5	Application: Displays	Ch 8 of Wickens et al.
Nov 10	Application: Controls	Ch 9 of Wickens et al.
Nov 12	Application: Human computer interaction; Usability Testing	Ch 15 of Wickens et al.
Nov 17	Lab 2: Developing Warning Symbols	
Nov 19	Safety, Accidents & Human Error (Guest Speaker)	Ch 14 of Wickens et al.
Nov 24	Safety Programs; Improvement Projects; Social Factors; Economic Justification	Ch 14, 19 of Wickens et al.)
Nov 26	(no class) Thanksgiving Break	
Dec 1	Term Projects & Presentations	
Dec 3	Term Projects & Presentations	
TBA	Final Exam Review	
Dec 14	**Final Exam Monday, Dec 14 <sup>th</sup> 8:00am-10:30am	

*Schedule subject to change based on topic coverage and unforeseen events.*

**\*\* Ask about SECOND CHANCE FINAL**