

INDH 4321: Ergo, HF, & Workplace Design  
Summer 2015, M, W: 12:00PM – 2:50PM, Rm: TBD

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The information contained in this class syllabus is subject to change without notice.  
Students are expected to be aware of any additional course policies presented by the  
instructor during the course.  
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**Instructor:** Dr. Magdy Akladios, Associate Professor  
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**Office hours:** 8:30 AM - 11:30 AM Monday & Wednesday (by appointment). Additional hours available by appointment.

**Textbook:** Kroemer, K.H.E.; and Grandjean, E. 1999, 5<sup>th</sup> Edition. Fitting the Task to the Human. Taylor & Francis Inc., Philadelphia, PA.

**Prerequisites:** None

**Quality Enhancement Plan (QEP)...Applied Critical Thinking for Lifelong Learning and Adaptability:**

- I. Applied Critical Thinking Statement: This course has been authorized by UHCL as an Applied Critical Thinking (ACT) Course which means that in addition to learning about the specified course content, students will be engaged with some or all of the Elements of Thought and Universal Intellectual Standards of critical thinking. The objective of an ACT course is to develop the student's ability to become skilled at analysis and evaluation by applying a set of intellectual tools that may be effectively used across all disciplines (as well as to the student's personal life). Based on the Foundation for Critical Thinking model (<http://www.criticalthinking.org/>), critical thinking involves thinking for a *purpose*, asking *questions*, using *information*, applying *concepts*, drawing *inferences and conclusions*, identifying *assumptions*, anticipating *implications and consequences*, and recognizing *points of view*. The Universal Intellectual Standards that are applied to these Elements of Thought of critical thinking in order to develop Intellectual Traits include *clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness*.
- II. Description of Course and how Critical Thinking is Present:  
How do I use the principles of Ergonomics/HF in order to provide a workplace that is safe and comfortable to users?  
In this course you are expected to learn and apply biological, anatomical, biomechanical, physiological, anthropometrical, and engineering principles to design in order to improve workplaces and environments to make them safe and efficient for human use. Students are expected to assess stresses such as, heat and cold exposures, vibration, pressure, illumination, tool design, and the presentation of visual, auditory and other sensory forms of information.

The central questions of this course are:

- How to identify ergonomic problems?
- How to design viable solutions to eliminate these problems?

When engaging critical thinking within this course, practitioners must be able to identify relevant concepts such as human abilities, capabilities, and limitations in order to enhance productivity, safety, and comfort. They do this by identifying significant information within the operating environment and precisely applying relevant concepts listed above.

Students will be able to apply practical concepts of human factors/ergonomics including human behavior, abilities, and limitations, to the design of tools, machines, systems, tasks, jobs, and work places for enhanced productivity, safety, comfort, and effective use of the human as a systems component.

### **Program Objectives (for ABET):**

Program Educational Objectives for Industrial Hygiene students are that students should:

1. Apply the fundamental principles and the practice of industrial hygiene to address the health of workers, the community, businesses, government, education/research, or other work environments;
2. Communicate and interact effectively with technical and non-technical audiences;
3. Integrate ethical, social, current, and global issues and responsibilities in their practice;
4. Work individually or on a team to critically analyze and address complex problems in occupational health;
5. Recognize that the practice of industrial hygiene requires ongoing learning, and undertake appropriate activities to address this need.

Program Educational Objectives for Safety students are that students should:

1. Anticipate, recognize, and evaluate hazardous conditions and practices affecting people, property and the environment, develop and evaluate appropriate strategies designed to mitigate risk;
2. Communicate and interact effectively with technical and non-technical audiences;
3. Integrate ethical, social, current, and global issues and responsibilities in their practice;
4. Work individually or on a team to critically analyze, interpret, and address problems in occupational and environmental safety; and
5. Recognize that the practice of safety requires ongoing learning, and undertake appropriate activities to address this need.

### **IH Course Outcomes:**

Of the following general Program for outcomes for Industrial Hygiene students, only 2, 3, 4, 6, 10, 11, and 12 apply to this course:

1. Develop a broad base knowledge in science, math, and social sciences;
2. **Anticipate, recognize, and quantify agents, factors, and stressors generated by and/or associated with defined sources, unit operations, environmental processes, & work tasks;**
3. **Understand the physiologic and toxicologic interactions of physical, chemical, and biological, agents, as well as ergonomic factors, with biological systems and the potential effects of occupational and environmental contaminants;**
4. **Evaluate qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on pathways and modes of ;**
5. Conduct experiments and interpret data and results from epidemiologic and toxicologic studies for the evaluation of health risks associated with occupational and environmental exposures;
6. **Evaluate and recommend engineering, administrative, and personal protective equipment controls or other interventions to reduce or eliminate hazards;**
7. Recognize important ethical, social, cultural, global, and current issues impacting worker health and the environment;
8. Understand and apply current applicable business and managerial practices;
9. Interpret and apply current applicable occupational and environmental regulations;

10. **Participate as a team player in the development of scientific reports, and technical summaries;**
11. **Effectively communicate verbally and in writing using computers and state of the art media; and**
12. **Recognize the importance of continuous and ongoing learning.**

**Safety Course Outcomes:**

Of the following general Program for outcomes for Safety students, only 3, 6, 10, 11, and 12 apply to this course:

1. Develop a broad base knowledge in science, math, social, and applied sciences;
2. Apply knowledge to anticipate, recognize, and quantify agents, factors, and stressors generated by and/or associated with defined sources, unit operations, environmental processes, & work tasks;
3. **Develop an ability to recognize, analyze, evaluate, management systems and SHE programs to prevent hazardous acts and conditions that lead to loss events. The programs will include cost/benefit analysis, training programs, etc.;**
4. Apply adult learning theories in the completion of the SHE Training;
5. Develop and evaluate appropriate strategies designed to mitigate risk;
6. **Evaluate and recommend engineering, administrative, and personal protective equipment controls or other interventions to reduce or eliminate hazards;**
7. Recognize important professional, ethical, social, cultural, global, and current issues impacting worker health and the environment;
8. Understand and apply current applicable business and managerial practices;
9. Interpret and apply current applicable occupational and environmental regulations;
10. **Participate as a team player in the development of scientific reports, and technical summaries;**
11. **Effectively communicate verbally and in writing using computers and state of the art media; and**
12. **Recognize the importance of continuous and ongoing learning**

**Applied Critical Thinking Student Learning Outcomes (ACE-SLO):**

ACT-SLO1: Identify significant and relevant ergonomic and human factors information when examining a work environment

ACT-SLO2: Accurately and precisely use Human factor/ergonomic concepts and models to diagnose a work environment

ACT-SLO3: Derive logical conclusions which provide relevant solutions for a work environment

ACT-SLO4: Demonstrate fair consideration of relevant and significant points of view when evaluating ergonomic and human fact outcomes.

**Vocabulary of Critical Thinking:**

In this course, students will learn and use the vocabulary of critical thinking which will include an understanding and use of both the Elements of Thought and the Universal Intellectual Standards. Elements of Thought\*: In this course, we will consider and use eight (8) elements of thought:

1. Purpose: Goals and objectives
2. Question at Issue: Problem, issue, and misconception
3. Information: Facts, data, evidence, observations, reasons, and experiences
4. Interpretation and Inference: Solutions and conclusions
5. Concepts: Definitions, models, laws, theories and principles
6. Assumptions: Axioms, presuppositions, and a-priori facts or knowledge 3
7. Implications and Consequences: Inferences, effects, and outcomes
8. Point of View: Perspectives, frames of reference, and orientations

**Universal Intellectual Standards\*:**

In this course, we will consider and use nine (9) universal intellectual standards including clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness.

\*Paul, R., and Elder, L. (2009). Critical Thinking: Concepts and Tools (6th ed.). Tomales, CA: Foundation for Critical Thinking Press Critical Thinking Process

There are four major aspects of the Applied Critical Thinking Process, termed as the 4 C's: curiosity, connections, creativity, and communication. In this course, the predominant C in the student learning objectives is **connections**.

III. Major Activities (see activities below...This is mainly included in the term project). Please provide narrative on how you activities promote/assess the three SLO with ACT elements and standards.

**Tests/Assignments:**

Major sections of your grade will include two midterm exams, a Final exam, and a term project. In addition, students are expected to turn in HW assignments and make their presentations on the scheduled dates as will be discussed in class. Assignments/proposals turned in late will be assessed a 10% grade penalty per week, beginning the day following the due date. The 10% grade penalty is also applicable to students who seek an incomplete grade (I) for the course.

Part of your HW assignments shall include "Journals" based on current events as they relate to the topics discussed in class. You will need to clearly explain the journal that you read, analyze and report on your findings, and you also must include references.

Assessment Methods (see project description below as they map to the "Elements of Thought" described above). Examples of ways to assess whether students are rated as unacceptable, acceptable, or excellent may include presenting ideas and concepts in class, presenting these concepts on paper, and the way in which they find solutions to ergonomic problems presented in class. This may include the creativity in finding these solutions, practicality of these solutions if they were to be implemented in real life. The four C's of critical thinking include curiosity. The measure of curiosity in class assignments may include the method(s) used to suggest solutions, the research carried out to find available equipment, and researching similar cases and benchmarking from a variety of cases. Using experimentation and established theory, the practitioner then discusses logical interpretations leading to significant solutions, improving safety, hygiene, and productivity.

<b>Grading:</b>	Homework Assignments	20%
	Project*	20%
	Exam 1	20%
	Exam 2	20%
	Final	20%
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	Total	100%

\*Project/Presentation: The project is worth 20% of your entire grade. This is how it is broken down:

- 20% from your classmate evaluation of your presentation
- 80% from my (or an average of other professors-should there be any in attendance)

In your presentation, I look for Information that you produced using sound data, facts, and observations, the use of Concepts through defining laws and principles, and your level of Interpretation and Inference by drawing conclusions, and coming up with feasible and practical solutions.

At a minimum, you need to show the following:

- A clear Cover page including a **relevant** project title, TOC, Abstract, Intro, Body, Conclusion. Your Body may include Methods, Analysis, Results, Discussions, or some combination of these.
- A **clear** print quality, titles, good layout, readability, flow, a strong reference list to indicate extent of research and effort, the type of sources (recent vs. old), etc.
- **Relevance** of the topic to the class
- **Depth and breadth** of your own scholarly thinking and intellect present in your project
- **Solutions provided need to be feasible, practical, and producible.**

**Grading scale:**

		A	92-100%	A-	88-92%
B+	86-87%	B	80-85%	B-	78-79%
C+	76-77%	C	70-75%	C-	68-69%
D+	66-67%	D	60-65%	D-	58-59%
		F	<58%		

The project will be graded and an aggregate score for evaluation how well a student is doing on both learning outcomes.

The following assessment levels will be considered:

- Excellent: 90% and above
- Acceptable: 70% to 89%
- Unacceptable: 69% and below

Artifacts	Artifacts Detail	Targeted SLO
<b>Project</b>	Students will be assessed on their capability to: (1) Accurately define common Internet and Web acronyms. (2) Accurately sketch (facts) the TCP/IP reference model. (3) Precisely identify (facts) common Internet services and their business application. (4) Explain clearly the notion (concept) of social web and its implication on business.	ACT-SLO1: Identify significant and relevant ergonomic and human factors information when examining a work environment ACT-SLO2: Accurately and precisely use Human factor/ergonomic concepts and models to diagnose a work environment ACT-SLO3: Derive logical conclusions which provide relevant solutions for a work environment ACT-SLO4: Demonstrate fair consideration of relevant and significant points of view when evaluating ergonomic and human fact outcomes.

**Use of Class Products in Assessment:**

The University of Houston–Clear Lake may use your work in this class to generate assessment data. Any works used will be used only for educational purposes.

**Academic Honesty:**

All students at the University of Houston–Clear Lake are expected to maintain complete honesty and integrity in all academic work attempted while enrolled at the University. This standard of conduct includes reporting incidents of alleged violation of the honesty policy to the instructor involved or, if necessary, to the appropriate academic dean. Each student acknowledges, by the mere act of turning in work for a grade, that he or she has honored the Academic Honesty Code, which states, *“I will be honest in all my academic activities and will not tolerate dishonesty.”* Your participation in this class constitutes your acceptance of the UHCL Academic Honesty Policy.

**Other Important Information:**

UHCL Police: 281-283-2222

UHCL Weather Hotline for Building closings: 281-283-2221

**Drop date:** TBD

**6-Drop Rule Limitation:**

Students who entered college for the first time in Fall 2007 or later should be aware of the course drop limitation imposed by the Texas Legislature. Dropping this or any other course between the first day of class and the census date for the semester/session does not affect your 6 drop rule count.

Dropping a course between the census date and the last day to drop a class for the semester/session will count as one of your 6 permitted drops. You should take this into consideration before dropping this or any other course. Visit [www.uhcl.edu/records](http://www.uhcl.edu/records) for more information on the 6 drop rule and the census date information for the semester/session.

**Students with Disabilities:**

If you are certified as disabled and are entitled to accommodation under the Americans with Disabilities Act, Section 503, please see the instructor as soon as possible so that arrangements for accommodation can be made. If you are not currently certified and believe you may qualify, please contact the UHCL Health and Disability Services Office at (281) 283-2627.

**Tentative Course schedule**

#	Date	Topic
1	June 9	Intro & History of HF/Ergo
2	June 10	Ch 1: Muscular Work + Ch2: Nervous Control of Movements
3	June 11	Ch 3: Improving Work Efficiency + Ch 4: Body Size (Anthropometry)
4	June 16	Anthropometry HW due + Ch6: Physiology & Heavy Work
5	June 17	<b>Exam 1 (Covers: Intro, Ch1, 2, 3, 4, and 6)</b>
6	June 18	Review Exam Questions
7	June 23	Risk Factors (from various outside sources)
8	June 24	Ch 7: Handling Loads + NIOSH Lifting Equation
9	June 25	Ch 8: Skilled Work + Ch 19: Vibration
10	July 9	<b>Exam 2 (Covers: Ch 7: Handling Loads, NIOSH Lifting Equation, Risk Factors, Ch 8: Skilled Work + Ch 19: Vibration)</b>
11	June 30	Ch 16: Night Work & Shift Work (Circadian Rythms)
12	July 1	Human Factors concepts and Cognitive Ergonomics
13	July 2	Ch 11: Fatigue
14	July 7	Vision, Ch 17 + Ergonomic Principals of Lighting, Ch 18
15	July 8	Project Presentations
16	July 9	<b>Final Exam (Covers: Ch16-Circdian Rythms, HF, Ch17-Vision, and Ch18-Light)</b>

**If time allows:**

- Ch 5: Design of Workstations
- Ch 20: Indoor Climate

**Updated:** June 29, 2015  
**By:** Dr. Magdy Akladios