

IEE 3420: Ergonomics and Design

Course Syllabus

Catalog Data

An introduction to ergonomics affording students the necessary knowledge essential for the psychological and anthropometrical development leading to good design. Emphasis is placed on health and safety. A design project is required.

Textbooks

Required:

Kroemer, K.H.E., Fitting the Human: Introduction to Ergonomics, CRC Press

Recommended:

Freivalds, A., Neibel's Methods, Standards and Work Design, McGraw Hill.

References

Pheasant, S. & Haslegrave, C., (2005). BodySpace: Anthropometry, Ergonomics, and the Design of Work, 3rd Ed. CRC Press.

Jordan, P., (1998). An Introduction to Usability, Taylor & Francis.

Coordinator

Dr. T. K. Fredericks

Prerequisites by Topic

1. Basic knowledge of statistics; means, standard deviations, and percentiles.
2. Basic knowledge of presentation software, worldwide web, and e-mail.

Objectives

At the end of the semester the student should have the ability to:

1. Accurately recognize and evaluate hazards (ergonomic in nature) which are likely to cause occupational illnesses or injuries.
2. Design and redesign tasks and workstations to fit employees.
3. Apply the knowledge, skills, and abilities obtained in IEE 3420 into an industrial based problem.

Class Policies

1. All tests will be closed book, closed note type.
2. No make-up tests will be given.
3. Late assignments and lab reports will not be accepted.

Individual Work

All students are expected to do their own work on each exam, homework assignments, and lab project unless specifically instructed to work in groups. Anyone that does not follow this policy will be given a zero for the assignment and will be recommended for dismissal from the course.

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at <http://catalog.wmich.edu> under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test

Attendance

Attendance will not be taken; however, it is suggested that you attend all scheduled lectures since much of the material covered in class will supplement the text material. You are responsible for all of the assigned reading plus the information covered in lecture.

Topics by week (Tentative)

Wk 1	Introduction (Ch. 1 - Pheasant & Haslegrave; Ch. 1 - Kroemer)
Wk 2	Musculoskeletal, cardiovascular and nervous system (Ch. 4 - Freivalds; Ch. 2, 3 - Kroemer); Anatomical position, reference planes and movements (Ch. 2, 4 - Kroemer, Ch. 5 - Freivalds; Ch. 4 -Pheasant & Haslegrave)
Wk 3	MLK Day (1/20); Anatomical position, reference planes and movements (Ch. 5 - Freivalds; Ch. 4 - Pheasant & Haslegrave);
Wk 4	Anatomical position, reference planes and movements (Ch. 5 - Freivalds; Ch. 4 - Pheasant & Haslegrave); Anthropometry (Ch. 5 - Freivalds; Ch. 2 - Kroemer; Ch. 2, 3 - Pheasant & Haslegrave)
Wk 5	Anthropometry (Ch. 5 - Freivalds; Ch. 1 - Kroemer; Ch. 2, 3 - Pheasant & Haslegrave); Lab 1- Anthropometry
Wk 6	Workstation design (Ch. 5 - Freivalds; Ch. 18, 20 - Kroemer; Ch. 4 - Pheasant & Haslegrave),
Wk 7	Lab 1 Due ; Guidelines for seated work (Ch. 5 - Freivalds; Ch. 18 - Kroemer; Ch. 5 - Pheasant & Haslegrave); EXAM 1(tentative)
Wk 8	Guidelines for seated work (Ch. 5 - Freivalds; Ch. 18 - Kroemer; Ch. 7 - Pheasant & Haslegrave); Lab 2 -Chair design ;
Wk 9	Lab 2 Due , Hand tools (Ch. 5 - Freivalds; Ch. 4 - Kroemer; Ch. 6 - Pheasant & Haslegrave); Lab 3 -Hand tools
Wk 10	Lab 3 Due ; Design of cognitive work (Ch. 7 - Freivalds; Ch. 10, 11 - Kroemer)
Wk 11	Design of cognitive work (Ch. 7 - Freivalds; Ch. 20 - Kroemer)
Wk 12	Usability (Ch. 1, 2 - Jordan)
Wk 13	Usability (Ch. 3, 4, 5 - Jordan); Lab 4 -Usability ; EXAM 2(tentative)
Wk 14	Lab 4 Due ; Special Topics; Semester Projects + Presentations Due
Wk 15	Final Exam

Evaluation

Exam 1	16.67%
Exam 2	16.67%
Final	16.67%

Semester Project	25%
Labs & Homework	25%

Grading Scale (Tentative)

A= 90-100, BA= 88-89.9, B= 80-87.9, CB= 78-79.9, C= 70-77.9, DC= 68-69.9, D= 60-67.9,
E= Below 60

Semester Project

For the semester project you will be work in teams of 3 or 4. The format of the write up should be similar to the lab report. Prior to initiating your project, it must be approved. Please present logical arguments (literature) for the need for the work to be done. A Power Point presentation must accompany the written report.

Performance Criteria

The students should be able to:

Objective 1

- 1.1 Accurately apply standard problem solving techniques to multiple types of work environments. (1,3,4,5)
- 1.2 Determine the appropriate type of chart to use to solve problems identified in objective 1.1 (1,3,4,5)
- 1.3 Accurately interpret data gathered from charts. (1,3,4,5)

Objective 2

- 2.1 Collect reliable and reproducible data on humans and workstations. (2,3,4,5)
- 2.2 Accurately interpret the statistical meaning of data gathered on humans. (2,4,5)
- 2.3 Understand the ramifications (ethical and legal) of making appropriate recommendations in the workplace. (2,5)

Objective 3

- 1.1 Accurately perform time studies on manual, semi-automated, and automated tasks. (4,5)
- 1.2 Accurately perform work-sampling studies on manual and semi-automated tasks. (4,5)
- 1.3 Accurately apply predetermined time study techniques to justify recommendations. (4,5)

Objective 4

- 1.1 Accurately define a problem and its corresponding constraints. (4)
- 1.2 Function as a productive and effective member of a team. (4)
- 1.3 Document work in a scholarly manner. (4)
- 1.4 Present information and ideas in a professional manner. (4)