

## IE 430 – Ergonomics & Human Factors Engineering

Fall 2015

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**Lecture time:** 11:00-1:00 pm (Tuesday) & 1:00-3:00 pm (Thursday)

**Lab time:** TBA as required

**Location:** M2200 (Tue), M2187 (Th) and ErgoLab

**Instructor:** Mahmut Ekşioğlu, Ph.D.

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Office hrs: Tuesday (2:00-4:00 pm); Thursday: (3:00-5:00 pm) or by appointment

**Course website:** <http://moodle.ie.boun.edu.tr/>

**Enrolment key:** ie430f15

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### **Course Description:**

An introduction to ergonomics, methods and standards. Topics include: ergonomics definition, history and benefits; scientific foundation and principles; application of principles in the design of human-work and human-technology systems; work method analysis and development of time standards. Specifically, manual work, workstation, equipment, tool and control design; work environment design: noise, illumination, climate, ventilation, vibration, radiation and chemical substances; occupational health and safety; cognitive work design: information coding, display design, human-computer interaction, and user experience; time and motion studies; shiftwork and working hours; problem solving tools; basic lean manufacturing principles. The course is supported by industrial case studies. Laboratory assignments and a term project, as part of the course, provide students with an opportunity of learning by doing.

### **Required course material:**

Ekşioğlu, M., Ergonomics and Human Factors Engineering Lecture Notes, 2015.

Textbook: *Methods, Standards and Work Design*, by B. W. Niebel and A. Freivalds, 12th ed., McGraw-Hill, 2008.

### **Topics:**

1. Chapter 1: Methods, Standards, and Work Design: Introduction
2. Intro to Ergonomics
3. Chapter 2: Problem-Solving Tools
4. Chapter 3: Operation Analysis
5. Chapter 4: Manual Work Design
6. Chapter 5: Workplace, Equipment, and Tool Design
7. Chapter 6: Work Environment Design
8. Chapter 7: Design of Cognitive Work
9. Chapter 8: Workplace and Systems Safety
10. Chapter 9: Proposed Method Implementation
11. Chapter 10: Time Study
12. Chapter 11: Performance Rating and Allowances
13. Chapter 12: Standard Data and Formulas
14. Chapter 13: Predetermined Time Systems
15. Chapter 14: Work Sampling
16. Special Topics (e.g; Macro Ergonomics, Ergonomics Program Development, Lean Mfg Principles .. as time permits!)

**Grading Policy:**

Midterm	30%
Final	30%
Labs	10%
Term Project/Case Studies	10%
Homework	10%
Attendance	10%
Total	100%

**85≤A<100; 80≤BA<85; 75≤B<80; 70≤CB<75; 60≤C<70; 55≤DC<60; 50≤D<55; F<50**

**Provided that (the average of the two exam grades) ≥ (lowest interval value –10)** (e.g.; to receive a grade of D, the average of the two exams must be at least 50–10 =40; otherwise, one lower grade, F, will be given).

**NOTES:**

- (1) Attendance:** You are allowed to miss 3 lectures only without any deduction in the attendance score of 10%. You lose 2 points for each over three absences). More than 8 absences, your course grade will be F regardless of your total score!
- (2)** If you score < 30% for Midterm Exam, you fail the course and you won't be eligible to take the final exam. Withdraw the course!
- (3) Absence of Lab Demo and Lab Work:** If you miss any one of the laboratory exercises or report, you will fail the course (receive an F) regardless of your total score.
- (4) Term project/Case studies:** If you do not submit your project or case study work the maximum course grade you can receive is D regardless of your total score.

**Enrollment to Moodle:** It is very important and student responsibility to enroll course website with provided enrollment key. Most announcements and assignments will be made through the course website.

**Re-grading Policy:** If you believe that there has been an error in marking an exam or assignment, you must bring it to my attention immediately. No re-grade requests will be accepted more than one week after a paper has been returned to the student. **Students are allowed and strongly encouraged to see their exam papers! Students are also strongly encouraged to see the instructor for their questions related to the course!**

**Late Work:** Late assignments will not be accepted. If you are unable to attend the class at which the assignment is due, it is your responsibility to submit it earlier. Assignments are due beginning of the lecture. No assignments are accepted at the middle or at the end of the lecture.

**Exam Policy:**Unexcused absence from an exam will not be made up, and will result in a score of zero. The student must inform the instructor prior to the exam for an excuse to be considered. If you miss one of the exams without excused absence, you will fail the course (receive an F), regardless of your total score.

## Class Policy

**Cell phones:** Please turn-off your cell phones before entering to the classroom.

**Cheating** is absolutely subject to a disciplinary action and results in receiving an F.

**Modifications:** Changes to this syllabus and the assignment schedule may be made by the instructor. If so, they will be announced in class or through e-mail. Students are responsible for being aware of all such modifications.

## Reference Books *(You may find some of them in BU Library):*

1. Work Systems and the Methods, Measurement, and Management of Work by Mikell P. Groover, Prentice Hall, 2007.
2. Kodak's Ergonomic Design for People at Work, 2<sup>nd</sup> ed., The Eastman Kodak Company, Wiley, 2003.
3. Elements of Ergonomics Programs, U.S. Department of Health and Human Services, DHHS (NIOSH) Publication No. 97-117, March 1997.
4. Handbook of Human Factors and Ergonomics, 2<sup>nd</sup> ed., edited by G. Salvendy, John Wiley and Sons, 1997.
5. Ergonomics in Manufacturing, edited by W. Karwowski and G. Salvendy, published by the Society of Manufacturing Engineers, Dearborn, MI, 1998.
6. A Guide to the Ergonomics of Manufacturing, M. Helander, Taylor & Francis, 1995.
7. Ergonomics-How to Design for Ease and Efficiency, 2<sup>nd</sup> ed., K. Kroemer, H. Kroemer, and K. Kroemer-Elbert, Prentice Hall, 2001.
8. Work Design-Industrial Ergonomics, 5<sup>th</sup> ed., S. Konz and S. Johnson, Holcomb Hathaway Pub., 2000.
9. Fitting the Task to the Human—A Textbook of Occupational Ergonomics, 5<sup>th</sup> ed., K.H.E. Kroemer and E. Grandjean, Taylor and Francis, 1999.
10. Ergonomics in Computerized Offices, E. Grandjean, Taylor & Francis, 1987.
11. Cumulative Trauma Disorders—A Manual for Musculoskeletal Diseases for the Upper Limbs, Vern Putz Anderson, Taylor and Francis, 1988.
12. Manual Materials Handling, M.M. Ayoub and Anil Mital, Taylor and Francis, 1989.
13. Bodyspace—Anthropometry, Ergonomics and Design, Stephen Pheasant, Taylor and Francis, 1986.
14. Human Engineering Design Handbook, 2<sup>nd</sup> ed., W.E. Woodson, McGraw-Hill Book Co., 1992.
15. Human Engineering Guide to Equipment Design, Harold P. Vancott and Robert G. Kinkade, American Institute for Research, Washington, D.C., Joint Army-Navy-Air Force Steering Committee, Revised ed., McGraw-Hill/U.S. Government Printing Press, 1972.
16. Human Factors in Engineering and Design, 7<sup>th</sup> ed., by Mark S. Sanders and E.J. McCormick, 1993.
17. Motion and Time Study –Design and Measurement of Work, 7<sup>th</sup> ed., Ralph M. Barnes. John Wiley & Sons, 1980.
18. Motion and Time Study for Lean Manufacturing, 2<sup>nd</sup> ed., F.E. Meyers, Prentice Hall, 1999.