

**Work Design and Ergonomics**  
**EIN 4314 SEC 01**  
**TR 11:40-12:55**

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Book: Work Systems by Mikell Groover. Pearson Education: 2007.  
Lean Six Sigma Handbook by Michael George et al. McGraw Hill: 2005.

Course objectives: By the end of the semester, you should:

1. Know how to operationally diagram a process
2. Know how to develop a time standard for a repetitive job
3. Know how to evaluate the ergonomics of a repetitive job
4. Have experience conducting each of the above analyses and integrating them into a comprehensive job improvement analysis and report.

1/9 1/11	Intro to Work Design: Analysis, Design, and Creativity. (Read Chapters 1-2).
1/16 1/18	Lean Process Philosophy (Read Chapter 10, 20, Lean Six Sigma Ch 1 and Ch 9 until p206)
1/23 1/25	Charting Procedures, Value Stream Mapping and Operations Analysis – (Read Chapters 8-9, Lean 6S Ch 3, and assign Homework #1).
1/30 2/1	Developing an empirical time standard of the designed method (Ch 18, 12-13), (Schedule Lab 1)
2/6 2/8	Ratings and Allowances - Modifying time standards (Ch 17), (Do Lab 1, Hw 1 due)
2/13 2/15	Time Systems and Standard Data - Using existing time values (Ch 14-15), (Lab 1 due; assign Homework #2).
2/20 2/22	Making Improvements Through Workstation Organization - Designing an efficient and ergonomic workstation (Ch 3, Lean 6S Ch 9 from p206)
2/27 3/1	Review for Midterm, <b>Midterm</b>
3/6 3/8	Work Sampling, Indirect Work, and Learning Curves - Evaluating occasional and noncontinuous work (Ch 16, 19, Lean Six Sigma pgs 81-86)
3/13 3/15	Anthropometry, Work Physiology and Biomechanics - The science behind ergonomics (Ch 22-23)
3/27 3/29	Anthropometry, Work Physiology and Biomechanics - The science behind ergonomics (Chapter 25), (schedule Lab 2)
4/3 4/5	CTDs and Hand Tools - Effects of poor tool design on efficiency and safety (do Lab 2)
4/10 4/12	Job Evaluation – How much is a job worth; Putting it all together - case studies of successful projects (Ch 29-30; Hw 2 due)
4/17 4/19	Management and Case Studies - (Ch 27-28 and Case Studies; Project final report due)
4/24 10:30-12pm	<b>Final Exam</b>

### **Course goals and description:**

The design of work is an essential component of any industry or place of business. Optimization of the safety and efficiency with which workers can do their jobs can significantly improve a company's bottom line, as well as increase worker satisfaction. This class will provide tools and methods for evaluating current job processes and ergonomics and provide methods for improving them.

### **Course requirements:**

#### **Homeworks and Labs**

Homeworks and labs will be collected at the **beginning** of the class period in which they are due. Excuses for late assignments will only be accepted for **good** reasons that must be provided and approved at least one hour before class. Excuses at the beginning of class will **NOT** be accepted. I will still correct unexcused late papers but points will be taken off. Each homework and lab is worth 10% of your grade, for a total of 40% of your grade.

Homeworks and labs should be written clearly. Incorrect spelling and grammar **will** lower your grade. Make sure to justify any conclusions that you draw. **WHY** something occurs is more important than what occurs. All assignments should be written professionally, as if I were your boss or client rather than your professor.

#### **Midterms**

There will be a midterm on 3/1 that will cover all material we have discussed up to that point (the evaluation and analysis of a job). You are responsible for everything I go over in lecture as well as chapters covered in the book. I will make sample questions available to you before the exam. The second midterm will be held on the final exam day. It will be similar in length and in format to the midterm and cover the second half of the course. If due to some catastrophe/ emergency you are unable to attend an exam, let me know **as soon as you know**. Excuses at or after the exam will not be accepted. I will try to accommodate you if I think the excuse is valid. Each midterm is worth 15% of your final grade.

#### **Project**

Work Design is a very applied field. The only way to learn the material is to get some practical experience. The project will provide you with an opportunity to get this experience. Your project will require you to do a complete evaluation of a job using the material you learn in class. The earlier you pick a topic the sooner you can get started, so I would advise doing each evaluation as they are covered in class. A summary of the goals of your project is due by the end of January.

Final reports are due on 4/19. The report should be a complete evaluation and analysis of all of the work design and ergonomic topics that are appropriate for your job. Make sure to present your results in summary fashion so they are easy to interpret. It is important that you show me you understand what you have done. The final report should be written in impeccable English, be convincing, clear, concise, complete, professional etc. If you have any questions concerning what should be included, you are better off asking me than guessing. I will be happy to answer any questions about your project at any point throughout the term. You should turn in a hard copy and CD. The project is worth 20% of your final grade.

#### **Class Participation**

In order to keep the class interesting, I would like part of each class period to be spent discussing the material instead of just lecturing and note-taking. If there is not enough participation, I will start giving quizzes on the chapters that were due, so please read the chapters ahead of time.

#### **Research Participation**

The best way to appreciate the different parameters that affect productivity is to participate in a research project. Each of you is required to participate in one project sometime this term as a subject. Participation usually takes two hours or so. Grading is simply pass/fail depending on whether you show up and are serious. I will announce projects that need participation as the semester goes along.

**Program Educational Outcomes:**

<b>Industrial and Systems Engineering Program Educational Outcomes</b>	<b>Description</b>
a. Design and conduct experiments, analyze and interpret data.	Labs and projects require analysis and interpretation of empirical data
b. Design a system, component or process to meet desired needs.	Projects require design of new or improved system components
c. Identify, formulate and solve engineering problems.	Project requires identification, formulation and solving of productivity and ergonomic problems.
d. Communicate effectively.	The course requires extensive written communication in lab and project reports
e. Design, analyze, implement, & manage effective production & service systems.	The project requires design and analysis of either a production or service system. Later course topics include management issues.
f. Integrate processes involving people, material, equipment, information, & controls.	Work design and ergonomics requires resolving tradeoffs between people, information, and automation.