Work Analysis and Design
(IE 342); 3(2,1, 2)

A. Instructor

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Class Time : As listed in your Class Schedule
Lab Time : As listed in your Class Schedule
Office hours :Posted at my Office meeting outside office hours by appointment

B. Text Book

1. *Work Systems: The Methods, Measurement & Management of Work;* Mikell P. Groover; Prentice Hall; 2006.

C. Reference Books

1. *Methods, Standards and Work Design;* Benjamin W. Niebel and Andris Freivalds; 11th ed; McGraw Hill; 2003.
2. *Motion and Time Study for Lean Manufacturing;* Fred E. Meyers and Jim R. Stewart; 3rd Ed.; Prentice Hall; 2002.
3. *Motion and Time Study; Design and Measurement of Work;* Ralph M. Barnes, 7th Ed., John Wiley & Sons; 1980.

D. Reference Journals

- ✓ International Journal of Industrial Engineering & Production Research
- ✓ IIE Transactions
- ✓ Journal of Industrial Engineering and Management

E. Pre-requisites

- ✓ Manufacturing Processes II (IE 352)
- ✓ Engineering Statistics and Probability (STAT 324)

F. Course Description

Introduction to work analysis and design; methods engineering; study of the basic work measurement techniques; applications and limitations of the stop-watch time study, pre-determined motion time systems, standard data systems, and work sampling.

G. Learning Objectives

1. Ability to understand the relationship between productivity and work analysis and design.
2. Ability to approach a work design problem with the purpose of solving the problem.
3. Ability to recognize the importance of studying the entire system or process of doing work before undertaking a thorough investigation of a specific operation in the process.
4. Ability to investigate a specific operation with the goal of finding improvements to the operation and implementing these suggested improvements to the process or the layout.
5. Ability to use various techniques, tools, equipment, and instruments needed to carry out motion and time study.
6. Ability to use other methods for measuring work such as predetermined-time-systems, work sampling and physiological methods.
7. Ability to design, conduct, analyze and interpret experiments in industrial systems.

H. Course Outcomes (a, b, c, f and h)

As a result of completing this course, students will be able to:

a. Apply knowledge of mathematics, science, and engineering.
b. Apply and conduct experiments, as well as to analyze and interpret data and results.
c. Design, develop, implement, and improve a process, a component, and/or integrated system that include people, material, information, and energy to meet desired needs within realistic constraints such as economic, social, political, ethical, health and safety, manufacturability, and/or sustainability.
f. Understand professional and ethical responsibility.
h. Broaden their education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social context.

I. Course Topics

List of Topics	No of Weeks	Contact hours
Introduction; Productivity; Definition and Scope of Motion and Time Study	0.5	2.5
History of Motion and Time Study. The general problem solving process.	0.5	2.5
Work methods design; Process analysis	1.5	7.5
Activity charts; Man and machine charts; Analysis and charting techniques	2	10
Micromotion study; Motion study equipment; Film analysis.	0.5	2.5
Fundamental hand motions	1	5
Principles of motion economy	1	5
Motion study; Mechanization and automation	1	5
Time study; Time study equipment; Making the time study; Rating factor; Allowances; Standard time	1.5	7.5
Work sampling	1	5
Determining time standards from standard data and formulas	1	5
Predetermined time systems and 'MOST'; Computer applications	2	10
Measuring work by physiological methods; Fatigue and human factors.	0.5	2.5

J. Laboratory Experiments

1. Process Charting.
2. Operation Analysis.
3. Method Improvement.
4. Direct Time Study.
5. MTM1 Applications.
6. Test of Dexterity using Purdue Pegboard.

K. Course Project

Students are to select a manual task, make a full analysis of the existing method, find alternatives for the current method, evaluate these alternatives, select the best alternative, implement the best alternative, validate the implemented alternative (if it successfully improved the performance of the task in hand), and finally produce a full report along with a PowerPoint presentation of the work done in the project. There will be a lecture on the project content and development.

L. Summarizing Journal Articles

Students are to read and summarize one peer reviewed journal article of their interest. The article must be related to the field of work analysis and design. This is an extra bonus grade points assignment.

M. Grades

	Course Activity	Designated points	Due Dates	Week
1.	Homework	12 points	TBA	TBA
2.	Lab Activities	13 points	One week after lab activity	--
3.	1st Midterm Exam	10 points	Tue, November 4, 2014	8
4.	Summarizing and Presenting one peer review journal article	3 points (Bonus Assignment)	Class Time	12
5.	2nd Midterm Exam	10 points	Sun, December 21, 2014	15
6.	Course Project Submission and Presentation	15 points	Remaining Class & Lab Times	15
7.	Final	40 points	TBA	
	Total	100 points		

N. Course Policies

1. General

- Class starts at the time it's scheduled, **late students** will *not* be allowed to class after it starts. Please turn your Cell Phones off during class (**No Tolerance** for **ANY** type of cell phone use during class).

- Students must form **groups of 2** to work on homework assignments, laboratory experiments and on course project (choose carefully). Please note that the peer review journal article Summarizing and Presenting is an individual assignment **NOT** a group assignment.

- Assignments are due by the beginning of class on the day they are due. **Late assignments will not be accepted.** If you will not be in class on the day of homework's submission, make sure that someone will do the job for you.

- **Attending** laboratory activities is **a must** for *accepting the lab report*.

- Assignments (homework, laboratory reports, Summarizing one peer review journal article, and course project) must be computer typed, printed out and stapled with a **cover page** indicating assignment name, submission date and students' information.

- All assignments must be handed to instructor in class; no sliding under my office's door, dropping in my mailbox or sending by email.

- King Saud University Board of Regents expects two hours of study outside of class for every hour in the classroom. For this class, expect to spend about 8 hours of study outside of class each week.

- Read the assigned reading before coming to class. Learning is your responsibility

2. Homework

- There are six homework assignments in this class, each account for 2 points totaling 12 points.

3. Exams

- There are two exams in this class, each account for 10 points totaling 20 points.

- Midterm exams start at 9:00 am (lecture time) on the day they are scheduled.

- Midterm exams are not comprehensive (i.e. the final exam will cover the whole course material).

- Students are responsible for all lectures, exercises and laboratory materials covered regardless of an absence was or was not excused.

- There are no make-up exams. Any **missed midterm** will be made up for by 25% of the student's grade in the Final Exam, **Only In Case of Accepted Medical Emergency**

Excuse to the Student himself. In such case, the student is required to submit a medical report of the medical emergency accredited from King Khaled or King Abdulaziz University Hospitals within two weeks of the missed exam.

- Students are expected to write their solutions in a logical order starting from top of their answer sheet; "jumbled" solutions, even if they are correct, can only receive 75% of the grade.

- **Multiple** solutions with different **outcomes** for the same question receive zero of the grade (they mean you don't know what you are doing).

4. Class Project

- Students are to work on their class project in groups of **two**; and project topic must relate to the course of study and approved by the instructor.

- Each project group will present their class project to the whole class. Project presentation accounts for 20% of the project's grade.

- Each project group is required to submit three progress reports during the semester time indicating its progress in its project before submitting the final project report. Progress reports account for 20% of the project's grade. The due dates and content for these progress reports and the final project report are listed in the table below:

	Content	Due date
1	Project topic selection, introduction, problem definition, motivation and brief background (at least one page).	Week 4
2	Full literature review of the problem indicating the alternative approaches for solving such problem (at least 5 pages).	Week 8
3	Project objective and full methodology for solving the proposed problem (at least 5 pages).	Week 12
4	Validation (results), discussion and conclusion of your project in addition to the contents of the three progress reports	Week 14

5. Attendance

- You must attend at least 75% of all course activities in order to be able to complete this course.

- Total course activities are 30 lectures, 15 exercises and 15 laboratories.

- If you fail to attend a total of 45 activities (i.e. make 16 absences) you will be banned from attending the final exam.

- A list of students who are approaching critical level of absenteeism will be posted at my office and will be updated weekly (it is the student's responsibility to review this list on a weekly bases).

- Students are to submit official excuses for their absence to the course instructor within two weeks after the absence day. Accepting absence excuses is subject to the instructor's decision. Medical excuses from King Khalid Hospital (KKH) and other Governmental Hospitals are accepted. Excuses from Clinics are not accepted.

O. Statement on Cheating

King Saud University has no tolerance for acts of academic dishonesty. The responsibilities of both students and faculty with regard to academic dishonesty are described in detail in the Department's Policy Statement on Academic Dishonesty. By teaching this course, I have agreed to observe all of the faculty's responsibilities described in that document. By enrolling in this class, you have agreed to observe all of the student's responsibilities described in that document. **If the application of that Policy Statement to this class and its assignments is unclear in any way, it is your responsibility to ask me for clarification.**