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

A. Instructor

Ahmed El Sherbeeny, Ph.D., Assistant Professor
Tamer Khalaf, Ph.D., Assistant Professor

Website	: Blackboard
Contact	: through Blackboard
Office phone	: 4698535 or 4676301
Office	: Department of Industrial Engineering, Room # 2A 123/2.
Class Time	: As listed in your Class Schedule
Lab Time	: As listed in your Class Schedule
Office hours	: I adopt an open-office policy. You are encouraged to come to my office and ask questions, consult, provide feedback, or give suggestions at any time during the day. In addition, regular office hours are posted at my office.

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)

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

Students completing this course successfully will be able to:

1. identify the relationship between productivity and work analysis and design **[1.1, 1.2, 2.1]**.
2. approach a work design problem with the purpose of finding the best solution **[1.1, 1.2, 2.1, 2.2, 3.1]**.
3. 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 **[1.1, 1.2, 2.1, 2.2, 3.1]**.
4. investigate a specific operation with the goal of finding improvements to the operation and implementing these suggested improvements to the process or the layout **[1.1, 1.2, 2.1, 2.2, 3.1]**.
5. use various techniques, tools, equipment, and instruments needed to carry out motion and time study **[1.1, 1.2, 2.1]**.
6. use methods for measuring work such as time study, predetermined-time-systems, standard data systems and work sampling [**1.1, 1.2, 2.1**].
7. design, conduct, analyze and interpret experiments in industrial systems [**1.1, 1.2, 2.1**].

H. Course Learning Outcomes

Upon completing this course, students will:

1.1 Gain and apply the knowledge of engineering fundamentals, basic sciences (including, mathematics, physics, probability and statistics, chemistry), Islamic, Arabic, English, and social sciences appropriate to IE [***a***].

1.2 Demonstrate the impact of IE solutions on society, economy, and environment with ability to illustrate the importance of sustainable development [***h***].

2.1 Conduct experiments in IE, interpret and analyze results and be able to draw conclusions [***b***].

2.2 Design, develop, implement, and improve a process, product, and system under realistic constraint [***c***].

3.1 Apply Islamic ethical principles, legal, and norms of engineering practice to understand professional and ethical responsibility [***f***].

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.
7. MOST
8. Laboratory Exam

K. Course Project

Independent group project utilizing the principles of work measurement. Students are to select an industrial facility and make full analysis of an existing problem that affects the work in this facility supported with evidence. In addition, develop alternative solutions for the problem (with the purpose of improvement). Then they are to evaluate these alternatives, select the best alternative, implement the best alternative, and validate the implemented alternative (to examine whether it successfully – fully or partially – solved the problem in hand). Finally, students are to produce a full report along with a PowerPoint presentation of the work done in the project. The course project is performed in phases (continue reading).

L. Grades

	Course Activity	Designated points	Due Dates	Week
1.	Homework	6 HW ➔ 12 points	TBA	TBA
2.	Lab Activities	5 labs ➔ 10 points	Lab report is due one week after lab activity	TBA
3.	MOST Exam (in Lab)	3 points	TBA	TBA
4.	Laboratory Exam	5 points	TBA	TBA
5.	One Midterm Exam	10 points	Sun, April 9, 2017	9
6.	Course Project Reports Submission & Presentation	20 points	Sun, May 21, 2017	15
7.	Final	40 points	TBA	
	Total	100 points		

M. Course Policies

1. General

- Class starts at the time it is 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 MOST and Laboratory Exams are individual assignments **NOT** group assignments.

- **Assignments** (homework, laboratory reports, 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. 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 submission, please make sure that someone will do the job for you. **Attending** laboratory activities is **a MUST** for *accepting your lab report*.

- 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. Exams

- Midterm exam start at 6:30 pm on the day it is scheduled (After Maghreb prayer).

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

- Students are responsible for all course material covered in the textbook, lectures, exercises and laboratory activities regardless of an absence was or was not excused.

- There are no make-up exams. **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 **ONLY,** 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 do not know what you are doing).

3. Class Project

- Students are to work on their class project in groups of **2**; and project topics must be related to the course of study (you are graded for appropriate selection).

- Each project group will present their class project to the whole class. Project presentation accounts for 15% of the total 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 35% of the total project's grade. The due dates, grade value, and content for these progress reports and the final project report are listed in the table below:

Phase	Content	Due date
1	Project topic selection, introduction, problem definition and motivation for solution supported with evidence and objective of the project (at least two pages).	Week 8 (10%)
2	Full background of the problem indicating the alternative solutions for such problem within the scope of the project objective and their evaluation. All supported with evidence (at least 5 pages).	Week 10 (10%)
3	Selection (developing) of an appropriate solution and developing full methodology for implementing the selected solution within the scope of the project objective (at least 5 pages).	Week 12 (15%)
4	Full Project Report including implementation results of the selected solution, discussion of results and conclusions in addition to the three previous phases.	Week 15 (50%)

4. Attendance

- You must attend at least 75% of all course activities (lectures, exercises, and labs) in order to be able to complete this course. Total course activities are 75 hours (30 hours lectures, 15 hours exercises and 30 hours laboratory). If you fail to attend 57 hours (i.e. make 19 hours of absences), you will be banned from attending the final exam.

- 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 Private Clinics and hospitals are not accepted.

- 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).

N. 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.**