

## Engineering Experimental Design IE 520 (3)

### A. Instructor

Tamer Khalaf, Ph.D., Assistant Professor

Website : Blackboard  
Contact : through Blackboard  
Office phone : 4676301  
Office : Department of Industrial Engineering, Room # 2A 123/2.  
Class Time : As listed in your Class Schedule  
Office hours : Sun – Thu (10:00 am – noon)

### B. Text Book

*Design and Analysis of Experiments, 8<sup>th</sup> Edition*; Douglas C. Montgomery; Wiley; 2012.

### C. Course Description

Sampling and descriptive statistics, Parameter estimation, Tests of hypothesis on the means, variance, and portions, testing for goodness of fit, Non-parametric tests, Experiments with single factor, Randomized blocks, Latin squares and incomplete block designs, Factorial and fractional factorial designs, Regression analysis, Taguchi's concepts and approach to parameter design, Response surface methodology.

### D. Grades

	Course Activity	Designated points	Due Dates
1.	1 <sup>st</sup> Midterm Exam	20 points	Week 9
2.	2 <sup>nd</sup> Midterm Exam	20 points	Week 15
3.	Course Project Report Submission and Presentation	20 points	Week 16
4.	Final	40 points	TBA
	Total	100 points	

### E. Course Project

#### 1. Objective

- Students are to work on their class project individually.
- Objective of the course project is to apply the course material in a real situation; improve students' skills in data collection and analysis; and to allow students to utilize DOE methodologies.

#### 2. Project Requirements:

- Define an objective of your interest that is related to industry (manufacturing or services sectors).

- Define hypotheses relevant to your objective (i.e. the results of testing these hypotheses would serve achieving your objective).
- Define the desired response to be measured (dependent variable); which, would be considered an indicator or measure of your objective.
- Define the independent variables that you believe to have an effect on the dependent variable of interest.
- Define the desired levels of the independent variables.
- Design an experiment to examine the effect of the defined independent variables on the defined dependent variable.
- Collect real data that are relevant to your experiment.
- Test your hypotheses manually and using Minitab.
- Use regression in Minitab to build a relation between the response and the factors and their interactions, if applicable.
- Use Minitab to draw a response surface, if applicable.
- Discuss all results and draw conclusions.
- The experiment should have at least two factors with at least two levels (treatments) in each factor.
- The source of data has to be verified (factory documents, lab sheets, internet web sites)
- Each student has to submit a project report and present his project to the whole class.
- Project presentation accounts for 20% of the project's grade.

### **3. Attendance**

- You must attend at least 75% of all course activities in order to be able to complete this course. Total course activities are 16. If you fail to attend 12 activities (i.e. make 5 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.