

**DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE SYLLABUS**

<i>COURSE TITLE</i>	<i>ENGLISH CODE/NO</i>	<i>ARABIC CODE/NO.</i>	<i>CREDITS</i>			
			<i>Th.</i>	<i>Pr.</i>	<i>Tr.</i>	<i>Total</i>
Design of Industrial Experiments	IE 432	هـ 432 ص	3	2	-	3
<i>Pre-requisites:</i>	IE332					
<i>Course Role in Curriculum</i>	<i>Required or Elective:</i>		Required Core Course			
<i>Catalogue Description:</i> Principles of experimental design. Randomized complete block designs. Latin square and Greco-Latin square designs. General factorial designs. 2 ^k Factorial designs, Response surface methodology and robust design. Planning, performing and analysing industrial experiments.						

Textbooks:

Montgomery D.C. (2009), Design and Analysis of Experiments, 7th Ed., ISBN: 978-0-470-39882-1, John Wiley and Sons, N.Y

Supplemental Materials:

1. Box G, Hunter S., Hunter W., (2005), Statistics for Experimenters: Design, Innovation, and Discovery, 2nd Edition, John Wiley, NY
2. Cox D.R., (1992), Planning of Experiments, John Wiley, NY.
3. Cobb G.W, (2008), Introduction to Design and Analysis of Experiments, ISBN-13: 978-0470412169, John Wiley, NY.

Course Learning Outcomes:

By the completion of the course the student should be able to:

1. Understand the rationale behind teaching Design of Experiments (DOEs) as a course in Industrial Engineering
2. Appreciate the importance of (DOEs) as an effective approach for improving the quality and performance of various engineering systems and processes
3. Acquire the required knowledge for recognizing the need for applying DOEs in practice.
4. Know how to plan an experiment including the formulation of the problem under-study, the identification of the objectives, the selection of the relevant variables or parameters to be examined & the determination of the appropriate performance measures.
5. Develop an ability to effectively and efficiently design and execute industrial experiments.
6. Learn the necessary skills for analyzing the experimental data and interpreting the obtained results so that reliable conclusions can be drawn.

7. Obtain a background on how to utilize the Statistical and Engineering knowledge in detecting and modeling the potential causal relationship between the studied variables and the concerned performance measure(s).
8. Use Statistical & DOE software packages to analyze experimental data.
9. Present the results and conclusions drawn using DOE in a clear & proficient manner.

<u>Topics to be Covered:</u>		<u>Duration in Weeks</u>
1	Introduction to DOE, its link to IE & its importance as an approach to product and process improvement	1
2	Planning experiments and the main steps for employing DOE along with the aids and tools needed for effective applications of DOE	2
3	Selection of appropriate designs for comparative and factorial experiments	3
4	Assignments of the factors to the selected design: the concept of full & fractional factorial experiments & confounding (aliasing)	2
5	Analyzing Experimental data: Graphical tools, Half Normal Probability Plot, ANOVA & Regression Analysis, Data transformation	3
6	Interpreting & presenting experimental results & Case Studies	2

Student Outcomes addressed by the course: (Put a \checkmark sign)

(a)	an ability to apply knowledge of mathematics, science, and engineering	
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	\checkmark
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	
(f)	an understanding of professional and ethical responsibility	\checkmark
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

Key Student Outcomes assessed in the course: (b) and (f)

Instructor or course coordinator: Dr Khalid Al-Ghamdi

Last updated: February 2015