

University of Texas at El Paso
IE 3352 – Design of Experiments
Spring-2020 Syllabus

Instructor:	Jaime Sanchez, Ph. D.	
How to Reach:	Office: E226C Office Tel: 747-6394 E-mail: jsanchez21@utep.edu	
Office Hours:	Tuesday and Thursday 12:00-1:20 pm; Wednesday 5-6 pm or by appointment	
Prerequisite:	IE 3373 Engineering Probability and Statistical Models	
Textbook:	DESIGN AND ANALYSIS OF EXPERIMENTS. Eighth Edition, by Montgomery, D. C. Wiley ISBN 978-1-1181-4692-7	
Software:	Minitab Release 18 from my.apps.utep.edu	
Objective	To Understand the basic concepts about design and analysis of experiments and apply those in order to draw conclusions and make inference about industrial systems based on the information obtained from well-planned experiments in order to improve and optimize products and manufacturing processes.	
Course Description:	The relationship between the scientific method and the DOE is stated at the beginning of the course and is enforced every possible way to show that DOE is the core element of the scientific research. Both design and statistical analysis issues are discussed. Opportunities to use the principles taught in the course arise in all phases of engineering and scientific work, including technology development, new product and process development, and manufacturing process improvement.	
Class Content:	<ol style="list-style-type: none"> 1. Introduction to DOE 2. Completely Random Design with a Single Factor 3. Nonparametric Analysis and Transformations 4. Randomized Complete Blocks 5. Introduction to Factorial Designs 6. Regression Analysis and Fitting Regression Models 7. Two-Level Full and Fractional Designs 	<ol style="list-style-type: none"> 1. Examined 2. Examined 3. Covered and partially examined 4. Covered-Test 2 5. Covered-Test 3 6. Pending-Test 4 7. Pending- Test 5
Grading scheme:	First Test 25% Test 2 to 5 15% each, 60% Assignments 15% Total 100% Final Exam (optional) to improve average	
Assignments:	Problems will be posted in blackboard and will be graded. Assignments will not be accepted after the due date and time.	

University of Texas at El Paso
IE 3352 – Design of Experiments
Spring-2020 Syllabus

Class Attendance:	Attendance to all session is strongly recommended. Students are responsible for all the material covered in class.
Test:	There will be five short test in the semester in blackboard. Test dates will be announced in class. The final exam is optional to improve grade average.
Reading	Students are responsible of reading the material from the textbook previous to the class session.
Plagiarism:	Plagiarism or cheating will not be tolerated. All suspected cases will be treated according to the University Policy..
Accessibility	If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.
ABET: This course supports the following Industrial Engineering program outcomes, which state that our students will have	<ol style="list-style-type: none"> 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. 2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. 6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to Cover

1. Introduction
 - 1.1. Strategy of Experimentation
 - 1.2. Some Typical Applications of Experimental Design
 - 1.3. Basic Principles
 - 1.4. Guidelines for Designing Experiments
 - 1.5. A Brief History of Statistical Design

2. Experiments with a Single Factor: The Analysis of Variance
 - 2.1. The Analysis of Variance
 - 2.2. Analysis of the Fixed Effects Model
 - 2.3. Model Adequacy Checking
 - 2.4. Practical Interpretation of Results
 - 2.5. Sample Computer Output
 - 2.6. Discovering Dispersion Effects

University of Texas at El Paso
IE 3352 – Design of Experiments
Spring-2020 Syllabus

- 2.7. The Regression Approach to the Analysis of Variance
- 2.8. Nonparametric Methods in the Analysis of Variance.
- 3. Building Empirical Models
 - 3.1. Simple Regression Models
 - 3.2. Checking Model Adequacy
 - 3.3. Least Square Estimation Hypothesis Testing.
 - 3.4. Polynomial models.
- 4. Randomized Blocks, Latin Squares and Related Designs
 - 4.1. The Randomized Complete Block Design
 - 4.2. Balanced Incomplete Block Designs
- 5. Introduction to Factorial Designs
 - 5.1. Basic Definitions and Principles
 - 5.2. The Advantage of Factorials
 - 5.3. The Two-Factor Factorial Design
 - 5.4. The General Factorial Design
 - 5.5. The General Factorial Design
 - 5.6. Fitting Response Curves and Surfaces
 - 5.7. Blocking in a Factorial Design
- 6. The 2^k Factorial Design
 - 6.1. Introduction
 - 6.2. The 2^2 Design
 - 6.3. The 2^3 Design
 - 6.4. The General 2^k Design
 - 6.5. A Single Replicate of the 2^k Design
 - 6.6. 2^k Designs are Optimal Designs
 - 6.7. The Addition of Center Points to the 2^k Design
 - 6.8. Why We Work with Coded Design Variables
- 7. Two-Level Factorial Designs
 - 7.1. Introduction
 - 7.2. The One-Half Fraction of the 2^k Design
 - 7.3. The One-Quarter Fraction of the 2^k Design
 - 7.4. The General 2^{k-p} Fractional Factorial Design
 - 7.5. Alias Structures in Fractional Factorials and other Designs

University of Texas at El Paso
IE 3352 – Design of Experiments
Spring-2020 Syllabus

Statistic review

Links to videos about statistic

<https://www.youtube.com/watch?v=5N7L1cGCL-w&index=53&list=PL568547ACA9211CCA>
https://www.youtube.com/watch?v=FHT6e_mdGoU&list=PL568547ACA9211CCA&index=54
<https://www.youtube.com/watch?v=enQDKXI2PdA&index=55&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=hEx0ZShqRlc&list=PL568547ACA9211CCA&index=56>
<https://www.youtube.com/watch?v=oZ3OZtc9FpI&index=57&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=Oy6Co8-XkEc&index=58&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=mWE8PxPoYJY&index=59&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=BWJRsy-G8u0&index=60&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=dH6igFVoCAw&list=PL568547ACA9211CCA&index=61>
<https://www.youtube.com/watch?v=VPd8DOL13Iw&list=PL568547ACA9211CCA&index=62>
<https://www.youtube.com/watch?v=jyoO4i8yUag&index=63&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=BRnToiWxLS0&index=64&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=wGlbyNBxEM8&list=PL568547ACA9211CCA&index=65>
<https://www.youtube.com/watch?v=zD3VIBkwc-0&index=66&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=S8DL5i2y2TU&index=67&list=PL568547ACA9211CCA>
<https://www.youtube.com/watch?v=qV-WoquC4dA&list=PL568547ACA9211CCA&index=71>
<https://www.youtube.com/watch?v=51QZa7b0Ozk&index=72&list=PL568547ACA9211CCA>