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|  |  |  | ***IE 333 Design and Analysis of Experiments 3(3,1,1)*** | |  |  |  |
|  |  |  | |  | |  |  |
| **Catalog Data** | Introduction to design of experiments and its applications in industry; Hypothesis testing; | | | | | |  |
|  | Analysis of variance; Residual analysis; Block design; Randomized complete and | | | | | |  |
|  | incomplete designs; Two and multi factor factorial design; Introduction to response | | | | | |  |
|  | surface methodology. | | | |  |  |  |
| **Prerequisite** | STAT 324 | | | |  |  |  |
| **Co-requisites** | N/A | |  |  |  |  |  |
| **Level** | 7 |  |  |  |  |  |  |
| **Textbook** | Design and Analysis of Experiments by Douglas Montgomery (8th edition). | | | | | |  |
| **Learning** | To provide students with understanding of the principles of statistical design of | | | | | |  |
| **Objectives** | experiments and their analysis supported with real-life applications. | | | |  |  |  |
| **Topics (classes)** |  |  | Topic |  | Week | Contact, hr |  |
|  | *1.* | Introduction to Design of Experiments | |  | 2 |  |  |
|  | *2.* | Hypothesis Testing and Simple Comparative Experiments | |  | 2 |  |  |
|  | *3.* | Experiments with a Single Factor: Analysis of Variance | |  | 2 |  |  |
|  | *4.* | Randomized Complete and Incomplete Blocks Designs | |  | 1 |  |  |
|  | *5.* | General Factorial Designs | |  | 2 |  |  |
|  | *6.* | 2k Factorial Designs | |  | 1 |  |  |
|  | 7. | Regression | |  | 3 |  |  |
|  | 8 | Surface Response Methods | |  | 0 |  |  |
| **Laboratory Topics** |  | Minitab software | | |  |  |  |
| **Project work** | Independent group projects for design and analysis of an experiment. | | | | |  |  |
| **Computer Usage** | Course topics are covered in the computer lab using Minitab software. | | | | |  |  |
| **Learning** |  | 1. | Understand the theoretical basis of the need of running experiments and | | | |  |
| **outcomes** |  |  | experimental design | |  |  |  |
|  |  | 2. | Explain the source of errors | |  |  |  |
|  |  | 3. | Describe sampling distributions, hypothesis testing and simple comparative | | | |  |
|  |  |  | experiments | |  |  |  |
|  |  | 4. | Define experiments with a single factor and solve them with analysis of variance | | | |  |
|  |  |  | technique | |  |  |  |
|  |  | 5. | Explain randomized complete block designs | |  |  |  |
|  |  | 6. | Design experiments using general factorial design with two or more factors | | | |  |
|  |  | 7. | Conduct one factor and multi-factor regression | |  |  |  |
|  |  | 8. | Use surface response methods for optimization | |  |  |  |
|  |  | 9. | Learn how to analyze data using Minitab | |  |  |  |
| **Estimated** | Engineering Design: 3 credit hour or 100%. | | | |  |  |  |
| **Category Content** |  |  |  |
|  |  |  |  |  |  |  |
| **Prepared by** | *Dr. Ibrahim Almuhaidib, Dr. Adham Ragab and Dr. Shafiq Ahmed* | | | |  |  |  |
| **Preparation Date** | Spring 2021 | | | |  |  |  |

**Grading System:**

* 20 % Midterm (8th week, formula sheet provided)
* 5% Two assignments
* 10% Two quizzes
* 10 % Project
* 10 % Lab work
* 5 % Lab exam
* 40 % Final exam (formula sheet provided)