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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)