**King Fahd University of Petroleum and Minerals**
**Department of Mathematics and Statistics**
**STAT530: Design and analysis of experiments**

**Instructor**: Dr. Muhammad Riaz
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**Office Hours:** 3:15-4:15 pm UTR

**Course Description:**

**STAT 530: Design and Analysis of Experiments (3-0-3)**

Completely randomized design. Randomized block design. Latin square designs. Models: Fixed, random, and mixed models. Incomplete block design. Factorial experiments 2k designs. Confounding in 2k designs. Nested and Split-plot designs. Fractional and orthogonal designs. Fractional replicate and orthogonal designs. Using statistical packages (e.g. Statistica, Minitab, SAS, SPSS, etc.) to analyze real data sets.

**Pre-requisite:** Graduate standing

**Text and Package:**

**Text**: Montgomery, D.C. (2017). Design and Analysis of Experiments. 9th edition, Wiley, New York.
**Software**: **MINITAB**

**Course Objectives:**

STAT530 is intended to be a foundation course in Design and analysis of experiments. The emphasis is on understanding how to use experimental designs to solve real-world problems. Upon completion of this course the students should:

- Be familiar with different experimental designs and their analysis
- Understand the elements of using statistical techniques to make objective decisions in the face of uncertainty.;
- Understand the assumptions, methods, and implications associated with various methods of experimental designs and their analysis;
- Be proficient in using MINITAB and be able to interpret the associated output.

**Assessment***

| Activity | Weight |
|---|---|
| Class Evaluation (homework, quizzes, attendance, participation, etc.) | 15% |
| Project | 15% |
| Mid Term Exam | 30% |
| Final Exam (Comprehensive) | 40% |

**Grade Assignment**

Relative Grading based on relative performance of the students registered in this course.

**Academic Integrity**

All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

**General Notes**

Students are encouraged to regularly check the blackboard announcements.

**Syllabus**

| Week | Topic |
|---|---|
| 1 | Introduction to Designs of Experiments and Basic Principles |
| 2 | Layouts of experimental Designs and Analysis of Variance Technique |
| 3 | Blocking and Experiments with blocking Factors |
| 4 | Factorial Experiments |
| 5 | Two and Three Level Factorial Designs |
| 6 | Blocking and Confounding for Two and three Level Factorial Designs |
| 7 | Blocking and Confounding for Two and three Level Factorial Designs (Cont…) |
| 8 | Two and three level Fractional Factorial Designs |
| 9 | Design Resolutions |
| 10-11 | Nested Designs |
| 12-13 | Split plot and strip plot designs |
| 14-15 | Analysis of Covariance |
| 15 | Robust Designs |
| 16 | Projects Discussions |

**Project Description**

The project should be based on a real problem (with complete description) and a detailed analysis using the skills developed in the course. There should be some concluding remarks that refer to the real implications of your chosen problem, preferably in your major area. You may use online sources in your project with proper citation/reference.

**Project Requirements:**

- Each group should contain a maximum of 4 students.
- Each group should submit the following:
  - a formal report (pdf)
  - a power point presentation

Deadline: The end of semester (before the last day of classes)

Submission: email submission to riazm@kfupm.edu.sa + A Hard copy