Math 483/567 – Design and Analysis of Experiments

Course Description from Bulletin: Basic concepts for experimental design; introductory regression analysis; experiments with a single factor; experiments with more than one factor; full factorial experiments at two levels; fractional factorial design at two levels; full and fractional factorial design at three levels and at mixed levels; response surface methodology; introduction to computer experiments and space filling design.

Enrollment: Elective for B.S. in Statistics, Applied Mathematics, and other majors.

Textbook: C. F. Jeff Wu and Michael S. Hamada. (2011) *Experiments: Planning, Analysis, and Optimization, 2nd Edition*. John Wiley and Sons.

Reference Books:

Thomas J. Santner, Brian J. Williams, William I. Nots. (2003) *The Design and Analysis of Computer Experiments.* Spring-Verlag New York.

John Lawson (2015) *Design and Analysis of Experiments with R*. CRC Press.

Prerequisites: MATH 476 or MATH 474

Objectives:

1. Students will first review basic probability and statistics.
2. Students will learn how to perform introductory level regression.
3. Students will learn the concept of analysis of variance.
4. Students will learn full and fractional factorial designs at two levels and three levels.
5. Students will learn how to construct nonregular designs at mixed levels.
6. Students will learn the response surface methodology.
7. Students will learn the concept of robust parameter design.

Lecture schedule: 3 50 minute (or 2 75 minute) lectures per week

Course Outline: (Hours)

1. Basic Concepts for Experimental Design and Introductory Regression Analysis. (3)
2. Experiments with a Single Factor. (3)
3. Experiments with More Than One Factor. (4)
4. Full Factorial Experiments at Two Levels. (7)
5. Fractional Factorial Experiments at Two Levels. (4)

6. Full Factorial and Fractional Factorial Experiments at Three Levels, at mixed levels, at more than two levels (7)
7. Nonregular Designs: Construction and Properties. (2)
8. Response Surface Methodology. (2)
9. Computer experiments and space filling design. (5)

Assessment:

Homework Assignments	20-30%
Mid-Exam	20-30%
Projects	0-20%
Final Exam	25-35%

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