

Title (Units): SCI7530 EXPERIMENTAL DESIGN (2,2,0)

Syllabus Reviewed by: Michael Ng

Prerequisite/Co-requisite: SCI7430 STATISTICAL SOFTWARE IN BUSINESS AND MANAGEMENT

Objectives: This subject introduces various kinds of experimental designs involving factorial and uniform designs as well as design for computer experiments.

Calendar Description: This subject introduces various kinds of experimental designs involving factorial and uniform designs as well as design for computer experiments.

References:

- 1) D.C. Montgomery, Design and Analysis - Analysis of Experiments, 5th Ed., Wiley, 2001.
- 2) H. Toutenburg, Experimental Design and Model Choice, Physica-Verlag, 1995.
- 3) J.A. Cornell, Experiments with Mixtures, 2nd Ed., Wiley, 1990.
- 4) M.Hamada and Jeff C.F. Wu, Experiments: Planning, Analysis, and Parameter Design Optimization, Wiley, 2000.

Assessment: Continuous assessment (35%) and Final examination (65%)

Subject Content in Outline:

- I. Introduction (2 hours of teaching)
 - A. What is experimental design?
 - B. Applications of experimental design
 - C. Basic concepts
 - D. Brief introduction to various designs
- II. Experiments with a Single Factor (5 hours of teaching)
 - A. Two kinds of errors
 - B. Analysis of variance
 - C. Fixed effects and random effects
 - D. Multiple comparison tests
- III. Factorial Designs in Physical Experiments (10 hours of teaching)
 - A. Two-factor factorial designs
 - B. Fractional Factorial Designs: orthogonal and uniform designs
 - C. Orthogonal designs without and with interactions
 - D. Criteria for comparing factorial designs
 - E. Uniform designs
- IV. Optimal Designs (2 hours of teaching)
 - A. Models
 - B. Optimality measures
 - C. Kinds of optimal designs
- V. Design of Computer and Simulation Experiments (9 hours of teaching)
 - A. Design in system engineering

- B. Uniform designs
- C. Modeling techniques
- D. Construction of uniform designs
- E. Applications of uniformity to factorial designs