Soochow University

MAT 327 Experimental Designs and Analysis

Fall 2023

Course Credits: 4
Contact Hours: 55 hours
Instructor: TBA
Email: TBA

COURSE OBJECTIVES

This course is designed to provide students with an understanding of the principles and methods of statistical analysis of experimental designs. The course covers a range of topics including: completely randomized design, randomized complete blocks, factorial designs and their applications in analyzing the effects of multiple factors on a response variable, split plot, etc. The course emphasizes the practical aspects of statistical analysis, including data management, visualization, and interpretation of results.

Upon Completion of this Course, students will be able to:

1. Understand the basic principles of experimental design and statistical inference, and apply these concepts to the design and analysis of experiments

2. Be able to design and analyze factorial experiments to determine the effects of multiple factors on a response variable

3. Comprehend and apply statistical methods of experiment designs such as random effects models, split-plot design, etc

4. Use statistical software to analyze real-world datasets and present their findings in written reports

PREREQUISITES

MAT 204 Introduction to Probability

GRADING

Grades will be determined by accumulating points, with 100 points being the

maximum, as follows:

ITEM	POINTS
Quizzes	20 Points
Midterm 1	15 Points
Midterm 2	15 Points
Lab Reports	20 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

A $\geq$ 90 > B $\geq$ 80 > C $\geq$ 70 > D $\geq$ 60 > F.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Robert Libby, Douglas C. Montgomery, *Design and Analysis of Experiment*, John Wiley, 2001.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Experiment design overview Topic 2: Applications of experiment design Topic 3: Guidelines of experiment design Topic 4: History of statistical design **Assessments:** Quiz#1

Module 2	**Topics:** Topic 5: Simple comparative experiments Topic 6: Statistical analysis Topic 7: Analysis of variance Topic 8: Analysis of fixed effects model **Assessments:** Quiz#2 Lab Report#1
Module 3	**Topics:** Topic 9: The Randomized complete block design Topic 10: Statistical analysis of the RCBD Topic 11: The two-factor factorial design Topic 12: The general factorial design **Assessments:** Midterm#1 Lab Report#2
Module 4	**Topics:** Topic 13: Two level fractional factorial designs Topic 14: Response surface methods Topic 15: Experimental designs for fitting response surface Topic 16: Experimental designs for fitting response surface (Cont.) **Assessments:** Midterm#2
Module 5	**Topics:** Topic 17: Three level and mixed-level factorial and fractional factorial design Topic 18: The random effects model Topic 19: The two-factor factorial with random factors and the two-factor Topic 20: The split-plot design **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning

and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.

2) Assignments submitted in the wrong format will be counted as not submitted.

3) Failure to submit or fulfill any required course component results in failure of the class.

4) Make-up for midterm and final exams only with valid excuses, as defined by the University.

5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.