



# STA 437 Sampling Theory and Applications

Summer 2024

**Course Credits:** 4

**Contact Hours:** 56 hours

**Instructor:** TBA

**Email:**TBA

## COURSE OBJECTIVES

This course focuses on applied statistics, emphasizing practical aspects of sample design for surveys. Topics include stratified, clustered, systematic, and multi-stage sampling, as well as unequal probabilities and area probability sampling. The course also covers sampling errors, frame problems, cost factors, and practical design considerations. While theoretical concepts are reviewed, the focus is on practical applications. The course includes an exercise integrating different sampling techniques into a comprehensive design.

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

1. Gain a practical understanding of the fundamental ideas, concepts, and principles underlying probability sampling techniques;
2. Identify and apply sampling techniques effectively to address survey design challenges;
3. Calculate sample sizes for various types of sample designs;
4. Comprehend and evaluate the influence of sample design on survey estimates;
5. Learn to design and select complex probability samples for survey projects and receive expert feedback on sampling reports.

## PREREQUISITES

STA 202 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
2 Assignments	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:

Arijit Chaudhuri, *Survey Sampling*, 1st Edition, CRC PRESS, 2019.

### Recommended (Optional) Texts or Other Materials:

None

## COURSE TOPICS

MODULE	TASKS
Module 1	<b>Topics:</b> Topic 1: Introduction to Survey Sampling Topic 2: Basic Concepts in Probability Sampling Topic 3: Simple Random Sampling Topic 4: Systematic Sampling <b>Assessments:</b> Quiz#1



Module 2	<b>Topics:</b> Topic 5: Stratified Sampling Topic 6: Cluster Sampling Topic 7: Multi-stage Sampling Topic 8: Sampling with Unequal Probabilities <b>Assessments:</b> Quiz#2 Assignment 1
Module 3	<b>Topics:</b> Topic 9: Area Sampling Techniques Topic 10: Ratio and Regression Estimators Topic 11: Sample Size Determination Topic 12: Sampling Frames and Coverage Issues <b>Assessments:</b> Midterm#1 Assignment 2
Module 4	<b>Topics:</b> Topic 13: Nonresponse and its Implications Topic 14: Post-Stratification and Weighting Techniques Topic 15: Sampling Errors and Precision Estimation Topic 16: Design Effects in Complex Sample Surveys <b>Assessments:</b> Midterm#2
Module 5	<b>Topics:</b> Topic 17: Calibration Estimators in Survey Sampling Topic 18: Small Area Estimation Techniques Topic 19: Practical Considerations in Survey Sampling Topic 20: Applications of Survey Sampling in Various Fields <b>Assessments:</b> 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).

### **ACADEMIC 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**



蘇州大學  
Soochow University

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.