

## SOCI754 – Survey Sampling

Fall 2024

**Class Meeting Place/Time:** Virtual via Zoom, Mondays/Wednesdays, 11:00 a.m. – 12:30 p.m.

**Instructor:** Taylor Lewis, PhD

**Email:** [thlewis@rti.org](mailto:thlewis@rti.org) (preferred) or [talewis@email.unc.edu](mailto:talewis@email.unc.edu)

**Office Hours:** Virtual, by appointment

**Textbook:** There is no required textbook for the course, but a highly recommended one for further reading and to serve as a more detailed reference is Lohr, S. (2022). *Sampling: Design and Analysis. Third Edition*. Boca Raton, FL: CRC Press.

**Course Description:** Topics covered in this course include simple random sampling, systematic sampling, stratified sampling, cluster sampling, difference and ratio estimators, and strategies for estimating the size of a population of interest. We also discuss certain methodologies used in election polling and the impact of survey nonresponse.

### Learning Objectives:

1. Develop familiarity generating unbiased point estimates (e.g., means, totals, ratios) and measures of uncertainty from a variety of survey sample designs.
2. Understand how auxiliary information about the population can be used in either the sample design stage, estimation stage, or both, to increase the precision of point estimates.
3. Recognize when and why it can be advantageous to employ a sample design other than simple random sampling, such as stratified, clustered, or systematic sample designs, to estimate attributes about a finite population.

**Lectures:** Aside from a few class sessions reserved for review and in-class group assignments, this course will generally abide by a lecture format. Slides will be provided in advance. It is good practice to look them over prior to class. You are not expected to fully comprehend and memorize all the details and formulas, but a basic understanding will help you digest and/or reinforce the material, and perhaps enable you to flag for class discussion concepts you find confusing.

**Homework:** There will be 9 homework assignments given over the course of the semester. These are designed to reinforce, and occasionally extend, your understanding of concepts and estimation strategies discussed during lecture. Homework will be assigned electronically on Canvas. You are to submit your answers to each assignment as a single file in either Microsoft Word or PDF format. All homework assignments are made available Monday morning and due the following Sunday evening. Late submissions will be accepted up until class time on Monday, with five points deducted. Unless you make an arrangement with me beforehand, no late work will be accepted after class begins on Monday, because we will go over the solutions at the start of class. Working with classmates on homework is permitted, but the work you submit must be your own.

### Grading:

Homework – 50%

Midterm Exam – 25% (timed during the week of 9/30 – 10/4)

Final Exam – 25% (untimed take-home to be submitted via Canvas no later than 12/8 at 11:59 p.m.)

Based on the weightings specified above, the student's final letter grade for the course will be assigned following UNC Graduate School grading scale (see <https://handbook.unc.edu/grading.html>):

	Description	Numeric Value
H	High Pass: Clear excellence	$\geq 92.5$
P	Pass: Entirely satisfactory graduate work	[70.0, 92.5)
L	Low Pass: Inadequate graduate work	[60.0, 70.0)
F	Fail	$< 60.0$

**Schedule:**

Class	Topic
Week 1 (8/19 & 8/21)	Module #1: Introduction to Sample Surveys
Week 2 (8/26 & 8/28)	Module #2: Simple Random Sampling – Part I <ul style="list-style-type: none"> <li>➤ HW #1 assigned (due 11:59 p.m. on 9/1)</li> </ul>
Week 3 (9/2 & 9/4)	Module #3: Simple Random Sampling – Part II <ul style="list-style-type: none"> <li>➤ No class 9/2 (Labor Day)</li> <li>➤ HW #2 assigned (due 11:59 p.m. on 9/8)</li> </ul>
Week 4 (9/9 & 9/11)	Module #4: Using Auxiliary Information in the Estimation Process <ul style="list-style-type: none"> <li>➤ HW #3 assigned (due 11:59 p.m. on 9/15)</li> </ul>
Week 5 (9/16 & 9/18)	Module #5: Stratified Sampling – Part I <ul style="list-style-type: none"> <li>➤ HW #4 assigned (due 11:59 p.m. on 9/22)</li> </ul>
Week 6 (9/23 & 9/25)	Module #6: Stratified Sampling – Part II <ul style="list-style-type: none"> <li>➤ No class 9/23 (Well-Being Day)</li> <li>➤ HW #5 assigned (due 11:59 p.m. on 9/29)</li> </ul>
Week 7 (9/30 & 10/4)	<b>Timed Midterm Exam</b> <ul style="list-style-type: none"> <li>➤ Open book and open notes</li> <li>➤ No other Internet-based sources permitted (should not be needed!)</li> <li>➤ No discussions with classmates – all work should be your own</li> <li>➤ No other new material covered this week</li> </ul>
Week 8 (10/7 & 10/9)	Module #7: Cluster Sampling <ul style="list-style-type: none"> <li>➤ Review of Midterm Exam</li> <li>➤ HW #6 assigned (due 11:59 p.m. on 10/13)</li> </ul>
Week 9 (10/14 & 10/16)	Module #8: Systematic Sampling <ul style="list-style-type: none"> <li>➤ HW #7 assigned (due 11:59 p.m. on 10/20)</li> </ul>

<b>Class</b>	<b>Topic</b>
Week 10 (10/21 & 10/23)	Module #9: Probability Proportional to Size Sampling <ul style="list-style-type: none"> <li>➤ HW #8 assigned (due 11:59 p.m. on 10/27)</li> </ul>
Week 11 (10/28 & 10/30)	Module #10: Estimators of Population Size <ul style="list-style-type: none"> <li>➤ HW #9 assigned (due 11:59 p.m. on XXX)</li> </ul>
Week 12 (11/4 & 11/6)	Module #11: Election Polling and Nonresponse
Week 13 (11/11 & 11/13)	In-Class Group Exercises – Part I
Week 14 (11/18 & 11/20)	In-Class Group Exercises – Part II
Week 15 (11/25 & 11/27)	<b>Thanksgiving week – no class</b>
Week 16 (12/2 & 12/4)	<b>Untimed Take-Home Final Exam</b> <ul style="list-style-type: none"> <li>➤ Open book and open notes</li> <li>➤ No discussions with classmates – all work should be your own</li> <li>➤ Due 12/8 at 11:59 p.m.</li> </ul>

**Options for Accessing SAS Software:**

- Note: most examples in the course slides demonstrate SAS syntax to select and analyze survey samples. While many assignments can be completed without it (i.e., using alternative software or a handheld calculator), I believe students will find that using SAS will be easiest.
- There is no need to purchase a license or visit a computer lab to access SAS. SAS On Demand is a free, cloud-based version that can be accessed from any Web browser. For more information on setting up an account, see <https://odamid.oda.sas.com/SASStudio/>.