

**THE GEORGE WASHINGTON UNIVERSITY**  
**Department of Statistics**

**Sample Surveys**  
**STAT 6287.10 (CRN 87260) – Fall 2024 – SYLLABUS**

**Time/Location:**

Thursday: 6:10 pm – 8:40 pm,  
Rome Hall (ROME) room 206, 801 22nd St NW, Washington, DC

**Instructor & TA:**

Name: Dr. Yang Cheng  
Phone: (301) 362-0212  
Email: yangcheng@gwu.edu  
Office hours: Thursday: 5:00 - 6:00 pm, 8:40 - 9:30 pm, or by appointment  
Teaching Assist: Yong Wang  
Phone: 571-359-2574  
Email: ywang98@gwu.edu  
Office hours: Monday, 5-6 pm, or by appointment.  
Location: Rome Hall 766

**Course Description:**

- Practical aspects and basic theory of design and estimation in sample surveys for finite populations
- Simple random, systematic, stratified, cluster multistage, and unequal-probability sampling
- Horvitz-Thompson estimation of totals and functions of totals, means, proportions, and regression coefficients
- Linearization technique for variance estimation
- Model-assisted ratio and regression estimation
- Two-phase sampling, sampling on two occasions, non-response effects, imputation, and other selected topics

**Course Prerequisite:**

STAT 4157 and STAT 4158.

**Textbook:**

Särndal, Swensson, Wretman: Model Assisted Survey Sampling, either the hardback or the paperback version, Springer.

Lumley: *Complex Survey, A Guide to Analysis Using R*, Wiley, paperback version

**Learning Outcomes:** As a result of taking this course, students will be able to do the following:

- Describe elements of planning a survey, especially the relationship of the population, frame, sampling scheme, and sample.

- Discuss unequal inclusion probabilities, reasons they arise, rationales for using them, and methods of implementation.
- Contrast, evaluate, and implement element sampling designs, including simple random, systematic, probability proportional to size, and stratified sampling.
- Discuss the relationships among estimators, sample inclusion indicators, finite population characteristics, parameters, and properties of estimators.
- Explain the usefulness of cluster sampling and its disadvantages.
- Describe the rationale for and statistical properties of estimators more complex than means including ratio and regression estimators.
- Illustrate concepts with numerical examples and perform computations for survey applications.
- Utilize commands in the R statistical program and in SAS for analyzing data from finite population surveys and summarize results.

### Course policies

- **Computing:** The class will be directed to use the R statistical package and SAS for simulation and some data analysis. No prior experience is assumed. R is free and can be downloaded onto personal computers. SAS is available to students. Basic instructions will be provided. It is your responsibility to allow time for computer work, including the possibility of temporary power outages, computer crashes, and changes in software locations. That is, it is advised that you do not start the computer portion of assignments at the last minute. Computers through simulation allow the illustration and exploration of various topics in this course, so they can be a useful instructional/learning tool. Both R and SAS have special commands for analyzing data from surveys of finite populations.
- **Homework**
  - Assignments are due in class as noted in the syllabus and web page. A 20% penalty will be imposed on homework assignments submitted up to one day late.
  - You may work together, but you must write your submitted work in your own words. This includes showing calculations, derivations, and proofs. This also includes summary sentences and paragraphs.
  - If we are unable to quickly decipher what you did and wrote, then no credit will be given.
  - The lowest homework grade will be dropped from the grade calculation. It is suggested that you complete all the homework assignments in order to learn material for the exams.
  - You are responsible for clearly and neatly organizing your homework and expressing your ideas. You should use complete sentences in answers requiring explanation and show intermediate steps in calculations and derivations. Staple your papers together. Include your name, the assignment number, and date on your assignment.

- **Exams:** You will be given two one-hour mid-term exams and one final exam. Information on exams will be announced in class. Tentatively, exam 1 will be on Thursday, September 19, 2024, and exam 2 will be on Thursday, October 31, 2024. The final will follow the schedule from the registrar; the most likely time for the final exam is Thursday, December 12, 2024. If you have a conflict for any reason, you must let the instructor know before the exam. Failure to do so will result in a zero for the exam.
- **Grading:** The relative contributions of grade components to the overall grade are as follows: Midterm Exam 1, 17%; Midterm Exam 2, 17%; Final Exam 36%; Homework 30%.

### **Average minimum amount of out-of-class or independent learning expected per week**

Students are expected to spend a minimum of 100 minutes of out-of-class work for every 50 minutes of direct instruction, for a minimum total of 2.5 hours a week. A 3-credit course should include 2.5 hours of direct instruction and a minimum of 5 hours of independent learning or 7.5 hours per week. More information about GW's credit hour policy can be found at: [provost.gwu.edu/policies-forms](http://provost.gwu.edu/policies-forms) (webpage); or [provost.gwu.edu/files/downloads/Resources/Assignment-Credit-Hours-7-2016.pdf](http://provost.gwu.edu/files/downloads/Resources/Assignment-Credit-Hours-7-2016.pdf) (form)

### **Disabilities and religious observance**

We will follow university policy in regard to observance of religious holidays and accommodations of disability. Students anticipating the observance of religious holidays impacting course schedule should let the instructor know during the first week of class. You may contact Dr. Cheng via email or phone in this regard or discuss your situation in person.

Students needing accommodation for disabilities should let the instructor know during the first week of class, or as soon as possible if your status changes. You may contact Dr. Cheng via email or phone in this regard or discuss your situation in person. Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information, please refer to <https://disabilitysupport.gwu.edu/>.

### **Additional notes**

University Police Department is located at Woodhull House, 2033 G Street.  
Emergency: 202-994-6111. Non-emergency: 202-994-6110. Otherwise: 911.  
Weather advisories and emergencies affecting campus: <http://campusadvisories.gwu.edu/>  
GWU Emergency Management: 202-994-4936

### **Emergency Preparedness and Response at The George Washington University To Report an Emergency or Suspicious Activity**

Call the University Police Department at 202-994-6111 (Foggy Bottom) or 202-242-6111 (Mount Vernon).

## **Shelter in Place**

Although it is unlikely that we will ever need to shelter in place, it is helpful to know what to do just in case. No matter where you are, the basic steps of shelter in place will generally remain the same.

- If you are inside, stay where you are unless the building you are in is affected. If it is affected, you should evacuate. If you are outdoors, proceed into the closest building or follow instructions from emergency personnel on the scene.
- Locate an interior room to shelter inside. If possible, it should be above ground level and have the fewest number of windows. If sheltering in a room with windows, move away from the windows. If there is a large group of people inside a particular building, several rooms may be necessary.
- Shut and lock all windows (tighter seal) and close exterior doors.
- Turn off air conditioners, heaters, and fans. Close vents to ventilation systems as you are able. (University staff will turn off ventilation as quickly as possible).
- Make a list of the people with you and ask someone to call the list in to UPD so they know where you are sheltering. If only students are present, one of the students should call in the list.
- Await further instructions. If possible, visit Campus Advisories for incident updates (<http://CampusAdvisories.gwu.edu>) or call the GW Information Line 202-994-5050.
- Make yourself comfortable and look after one other. You will get word as soon as it is safe to come out.

## **Evacuation**

An evacuation will be considered if the building we are in is affected or we must move to a location of greater safety. We will always evacuate if the fire alarm sounds. In the event of an evacuation, please gather your personal belongings quickly (purse, keys, GWorld card, etc.) and proceed to the nearest exit. Do not use the elevator. Once you have evacuated the building, proceed to our primary rendezvous location.

## **Alert DC**

Alert DC provides free notification by e-mail or text message during an emergency. Visit Campus Advisories for a link and instructions on how to sign up for alerts pertaining to GW.

## **Emergency Information**

Additional emergency information may be obtained by visiting the Campus Advisories webpage (<http://CampusAdvisories.gwu.edu>) or calling the GW Information Line at 202-994-5050.

## **ACADEMIC INTEGRITY**

I personally support the GW Code of Academic Integrity. It states: "Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate

authorization, and the fabrication of information.” For the remainder of the code, see: <http://www.gwu.edu/~ntegrity/code.html>

***University Policy on Religious Holidays:***

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance.
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations.
3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities.

**SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM**

**Virtual academic support**

A full range of academic support is offered virtually in fall 2020. See <https://coronavirus.gwu.edu/top-faqs> updates.

Tutoring and course review sessions are offered through Academic Commons in an online format. See [academiccommons.gwu.edu/tutoring](http://academiccommons.gwu.edu/tutoring)

Writing and research consultations are available online. See [academiccommons.gwu.edu/writing-research-help](http://academiccommons.gwu.edu/writing-research-help)

Coaching, offered through the Office of Student Success, is available in a virtual format. See [studentsuccess.gwu.edu/academic-program-support](http://studentsuccess.gwu.edu/academic-program-support)

Academic Commons offers several short videos addressing different virtual learning strategies for the unique circumstances of the fall 2020 semester. See [academiccommons.gwu.edu/study-skills](http://academiccommons.gwu.edu/study-skills). They also offer a variety of live virtual workshops to equip students with the tools they need to succeed in a virtual environment. See [tinyurl.com/gw-virtual-learning](http://tinyurl.com/gw-virtual-learning)

**Writing Center**

GW’s Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online. See [gwu.mywconline](http://gwu.mywconline).

**Academic Commons**

Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at [academiccommons.gwu.edu](http://academiccommons.gwu.edu).

**Disability Support Services (DSS) 202-994-8250**

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services to establish eligibility and to coordinate reasonable accommodations. [disabilitysupport.gwu.edu](http://disabilitysupport.gwu.edu)

**Counseling and Psychological Services 202-994-5300**

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. [healthcenter.gwu.edu/counseling-and-psychological-services](http://healthcenter.gwu.edu/counseling-and-psychological-services)

**Safety and Security**

1. In an emergency: call GWPD 202-994-6111 or 911
2. For situation-specific actions: review the Emergency Response Handbook at [safety.gwu.edu/emergency-response-handbook](http://safety.gwu.edu/emergency-response-handbook)
3. In an active violence situation: Get Out, Hide Out, or Take Out. See [go.gwu.edu/shooterpret](http://go.gwu.edu/shooterpret)
4. Stay informed: [safety.gwu.edu/stay-informed](http://safety.gwu.edu/stay-informed)