THE GEORGE WASHINGTON UNIVERSITY
Department of Statistics

Modern Theory of Sample Surveys
STAT 6287.10 (CRN 13825) – Fall 2016 – SYLLABUS

Time/ Location:
Monday: 6:10 pm –8:40 pm, Rome Hall, Room 206, 801 22nd street, NW

Instructor & TA:
Name: Dr. Yang Cheng
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Office hours: Monday: 5:30-6:00 PM, 8:40 – 9:30 pm, or by appointment
Teaching Assist: Yang Biao
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Office hours: Monday: 3:00 – 5:00 pm, at 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.

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 two days 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 Monday, October 10, 2016, and exam 2 will be on Monday, November 14, 2016.
The final will follow the schedule from the registrar; the most likely time for the final exam is Monday, December 12, 2016. 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%.

**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. Larsen 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 [http://gwired.gwu.edu/dss/](http://gwired.gwu.edu/dss/)

**Additional notes**

University Police Department is located at Woodhull House, 2033 G Street.


Weather advisories and emergencies affecting campus: [http://campusadvisories.gwu.edu/](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 maybe 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
DISABILITY SUPPORT SERVICES (DSS)
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: http://gwired.gwu.edu/dss/ 

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals
  http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices
  http://counselingcenter.gwu.edu/stress-management-college

SECURITY

In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.