## Course Information for Statistics 6287, Modern Theory of Sample Surveys

**The George Washington University, Fall of 2015**  
**Michael D. Larsen, Ph.D., Associate Professor of Statistics**

| Time/ Location | 223 Funger Hall, 2201 G Street NW, Washington, D.C.  
Class meets 6:10pm – 8:40pm. |
|---|---|
| Contact | mlarSEN at bsc dot gwu dot edu  
Office hour: Wednesdays, 2:10-3:00pm, 301D Old Main (1922 F Street) |
| Topics | 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, regression coefficients. Linearization technique for variance estimation. Model-assisted ratio and regression estimation. Computation. The second semester of this course will discuss two-phase sampling and sampling on two occasions, non-response effects, imputation, and other selected topics. |
| Assistant | TBA |
| Lecture Notes | Material to be delivered through the website includes syllabus, course information, lecture notes, assignments, assignment solutions, exam information, and practice exam problems and solutions. Students should download and print copies of lecture notes before class. |

## Course Goals/Learning Objectives

Students at the end of Statistics 6287 should 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 for simulation and some data analysis. No prior experience is assumed. R is free and can be downloaded onto personal computers. 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. R has 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. Solutions will be posted on the class web site.
  - 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.
  - 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.
  - The lowest homework score will be dropped from the grade calculation. There will be 11 homework assignments total.

- **Exams**: Two one-hour midterm exams and a final exam. Information to be included on exams will be announced in class. Exam One will be Monday, October 12, and Exam Two will be Monday, November 16. The final will occur during finals period and will follow the schedule to be produced by the university registrar. 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 contribution 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. Larsen 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/)
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://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices)

- **PLEASE SEE CURRENT GW PAGES AND DEPARTMENTS FOR UP-TO-DATE INFORMATION**