UNIVERSITY OF GUELPH   Department of Mathematics and Statistics

ST3320   FALL 2015
Sampling Theory with Applications

Course Outline

Lecturer: Dr. Ayesha Ali   **Office:**   MACN 509
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Venue: **CRSC 403**
Day/Times: MWF 10:30 – 11:20

Office Hours: TBA   MACN 509

Prerequisites: (MATH*1210 or IPS*1210),(1 of STAT*2050, STAT*3240,
            STAT*3110, BIOL*2250, STAT2250)

Required Text: *Elementary Survey Sampling*, 7th Ed. by Scheaffer, Mendenhall, Ott,
            and Gerow, Duxbury Advanced Series, 2011.

Recommended Texts: *Sampling Techniques*, 3rd Ed. by Cochran, John Wiley & Sons, 1997.
Model Assisted Survey Sampling by Sarndal, Swensson & Wretman, Springer Series in
Statistics, Springer Verlag.
Sampling: Design and Analysis by Lohr, Duxbury Press, 1999.

Evaluation: Participation   5%
            Assignments   25%
            Midterm   20%   (Wed. October 21, in class)
            Final Exam   50%   (Wed. December 15, 11:30-1:30pm)

The participation portion of your grade is based on your in-class participation and on a 5 to 10 minute class presentation of a solution to some pre-assigned question.

Course description:
In this course we will discuss methods that will facilitate the design, collection and assessment of data from sample surveys. After introducing basic sampling terminology and questionnaire design, we will focus on probability sampling from finite populations, and on computing the sampling distribution of sample estimators. We will then move onto specific sampling designs such as: simple random sampling, stratified sampling, and cluster sampling. For each sampling design, we will estimate standard quantities such as totals, means, proportions, and ratios, along with their corresponding variances, and how to do sample size calculations. We will cover most of Chapters 1-10 of the textbook.

Computing:
In industry, SAS is often used to facilitate computations for survey data. As such, we will learn how to use SAS to do homework questions. I will supplement the course material with tips on using SAS to help you use SAS in lieu of formal (weekly) labs.

Assignments:
Assignments will be posted on Courselink and due in class approximately every other week. These assignments are to be your own work, though you are encouraged to interact with other students. NO LATE ASSIGNMENTS WILL BE ACCEPTED.

Content: This is just a guideline, but should help you gauge the pace of the course.

Week	Topic
1	Introduction; terminology and notation. (Chapters 1, 2)
2	Bias; probability sampling; sample selection methods. (Chapters 2,3)
3	Sampling distributions; properties of parameter estimates; confidence intervals; sample sizes. (Chapter 3, **Assn 1 DUE FRIDAY** in class)
4	Simple Random Sampling; means, totals, proportions. (Chapter 4)
Mon. Oct. 12	**NO CLASS** – Thanksgiving
5	Ratio and regression estimation; difference estimation; efficiency. (Chapter 6, **Assn 2 DUE FRIDAY** in class)
6	Stratified sampling; sampling weights; optimal allocation. (Chapter 5)
Wed. Oct. 21	**MIDTERM** – in class
7	Stratified sampling; post-stratification, two-stage sampling. (Chapter 5, **Assn 3 DUE FRIDAY** in class)
8	Quota sampling; systematic sampling; 1-in-k systematic sampling. (Chapter 7)
9	Cluster sampling; one-stage, equal and proportional-to-size probabilities. (Chapter 8, **Assn 4 DUE FRIDAY** in class)
10	Cluster sampling; two-stage with equal cluster sizes or unequal probabilities. (Chapter 9)
11	Estimation of population size; direct, inverse, quadrat sampling. (Chapter 10)
12	Complex designs; bootstrapped variance estimation; design effects. (Chapter 11, **Assn 5 DUE <u>MONDAY</u>** in class)
Tues. Dec. 15	**FINAL EXAM 11:30 – 1:30**, room TBA

ACADEMIC MISCONDUCT: The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.