Fall 2017:   STAT*3320 Course Outline
Department of Mathematics and Statistics
University of Guelph

Course Description:

STAT*3320 Sampling Theory with Applications F (3-0) [0.50]
This course focuses on the design and analysis of survey samples for finite populations. Topics covered include: non-probability and probability sampling, simple random sampling, stratified sampling, cluster sampling, systematic sampling, double sampling, two-phase sampling and multi-stage cluster sampling. Expectation, variance estimation procedures and sample size calculations for the above techniques are included.
Prerequisites: (1 of IPS*1510, MATH*1210, MATH*2080), (1 of STAT*2050, STAT*3240, STAT*3100)

Class schedule:

Tuesday and Thursday, Sept 7 – Nov 30, 2017
10:00AM - 11:20AM
MACK315

Instructor Information:

Julie Horrocks
jhorrock@uoguelph.ca
MCN 518
Office Hours: By appointment.

Final Examination:

Date and Time: Mon December 11, 07:00PM - 09:00PM (2017/12/11)
Location: TBA

Required Texts:

Sampling, Steven K. Thompson, 3rd edition. Available FREE! online through the Library Reserve
    site (ARES) or this direct linke
https://ares.lib.uoguelph.ca/ares/ares.dll/plink?u-
    http%3A%2F%2Fonlinelibrary.wiley.com%2Fbook%2F10.1002%2F9781118162934%3Bjsessionid%3DA66C1D
    364E504E0DB1D2EAC6A40F2CE0.f01t02

Course Notes available on D2L CourseLink .
    https://courselink.uoguelph.ca/shared/login/login.html

Recommended Texts:

Complex Surveys: A Guide to Analysis Using R.
by Thomas Lumley
Available online through the University of Guelph Library Course reserves
https://ares.lib.uoguelph.ca/ares/ares.dll/plink?u-http%3A%2F%2Fdx.doi.org%2F10.1002%2F9780470580066

Introduction to Variance Estimation, 2nd Edition
by Kirk M. Wolter
Available online through the University of Guelph Library Course reserves
https://ares.lib.uoguelph.ca/ares/ares.dll?Action=10&Form=50&Value=185120

Available from Library Reserve desk, 2 hour reserve:
1) Elementary Survey Sampling, Mendenhall et al., 7th edition
2) Sampling: Design and Analysis , Lohr, 2nd edition

Assessments:

	Due Date	Percent of Mark	Learning Outcomes
Assignments		30%	
Assignment 1	Sept 21		1, 2, 3, 4
Assignment 2	Oct 5		2, 3, 4
Assignment 3	Nov 2		2, 3, 4
Assignment 4	Nov 16		2, 3, 4
Assignment 5	Nov 30		2, 3, 4,5
Midterm	Oct 17	30%	1-5
Final Exam	TBD	40%	1-5

Learning Outcomes:

1. Understand what differentiates design-based inference from the usual frequentist inference and recognize when the former is appropriate.

2. Design and implement various types of designs/samples (simple random, systematic, stratified, clustered, multi-stage).

3. Learn how to estimate totals, proportions, averages, and other quantities.

3. Understand, construct and use design weights.

4. Perform data analyses using statistical software.

5. Summarize and explain results of a statistical analysis to a non-expert.

Weekly schedule/syllabus (topics subject to change):

Tuesday	Thursday
	Sept 7- Course Outline Population, Sample/Parameter, Estimate Non-sampling errors (source: Lohr) Design-based Inference
Sept 12 Simple Random Samples Means, Totals, Expansion Estimator Survey weights, Horvitz Thompson Estimator survey package in R	Sept 14 Expectation, Unbiasedness Variance, Variance Estimate Graphics for survey data Distribute A1
Sept 19 Confidence Intervals	Sept 21 Sample Sizes A1 due
Sept 26 Proportions	Sept 28 Domains Distribute A2
Oct 3 Two-Way Tables	Oct 5 Systematic Sampling A2 due
Oct 10 – NO CLASS FALL STUDY BREAK	Oct 12 REVIEW
Oct 17 MIDTERM	Oct 19 Implementing SRS in special situations SRS with replacement
Oct 24 Ratio Estimates	Oct 26 Regression Estimates Distribute A3
Oct 31 Stratified Sampling	Nov 2 Stratified Sampling A3 due Fortieth Class Day Nov 3 – Last day to drop
Nov 7 Unequal Probability Sampling Cluster Sampling	Nov 9 Cluster Sampling Distribute A4
Nov 14 Multi Stage Sampling	Nov 16 Multi- Stage Sampling Publicly available data sets A4 due
Nov 21 Variance Estimation: Taylor series, JK, BRR	Nov 23 Raking, Post-stratified Weights Distribute A5
Nov 28 Two-Phase Sampling	Nov 30 REVIEW A5 due

Course Policies:

Grading Policies

- No late assignments will be accepted.
- There will be *5* assignments, but <u>only your best *4* assignments will count for evaluation.</u> If you do not hand in one assignment, or one assignment is late, the other *4* assignments will count towards your mark. While this in a sense gives you a "free" assignment that does not have to be submitted, it is in your best interests to submit all *5* assignments, because they reinforce concepts introduced in lectures and are good practice for the tests and you will get feedback.
- If you are unable to pass in an assignment due to sickness, then that will count as your "free" assignment, and your mark will be based on the remaining *4* assignments. If you miss two assignments, you will get a mark of 0 for one of them, unless you have a valid reason, in which case the assignment mark will be reweighted accordingly.
- Each assignment will be worth the same amount of your final mark (7.5%), even though assignment 1 may be marked out of say 10, assignment 2 out of 7, etc.
- Assignments and projects generally require use of statistical computing program. R is free to download. R is available on computers in
  - SCIE 1303, 1304, 1305 between 8:30 and 4:30 on weekdays when not booked
  - the library
  - on the web

  NOTE: These computers are shared and may be heavily used at some times. Please don't leave your assignment until the last minute!!!
- Assignments should be handed in to the STAT3320 INBOX on 3rd floor MacNaughton Building **before 5pm** on the due date (see above). Assignments will be returned in class. If you are not in class when assignments are returned they will be put in the STAT3320 OUTBOX on 3rd floor MacNaughton Building
- You can bring your calculator to the tests, but no computers or programmable calculators please! Absolutely no cell phones or blackberries, etc.
- If you miss the midterm, please see the instructor. If you miss the midterm for a valid reason, the percentage of the course mark assigned to the midterm will be moved to the final exam.
- If you miss the final exam for any reason, you must see your program counselor. University regulations require special procedures to be followed regarding the conduct of final examinations, including resource, if any, for missed final examinations. These procedures are out of my control.
- Should you need to miss a test or assignment for religious purposes, please advise the instructor <u>within the first two weeks of classes</u>.

Course Policy on Group Work:

Discussion often leads to better understanding and so we encourage group thinking. However, we urge you to not divide up the work. You will get the best value if you work together to increase your comprehension and not to do less work. Statistical analysis, data exploration, and the learning of statistical software only comes with experience. **Each student must hand in a separate complete assignment, and this must be original work and not be copied from another student.**

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor. Course Evaluation information (link to Course Evaluation website if conducted online, provide alternate information if conducted in-class)

Student Evaluations:

Student evaluations will be done online. The questions are available here:

https://mathstat.uoguelph.ca/advising

University Policies:

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration.

Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their

academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars are the source of information about the University of Guelph's procedures,