STA304H1 F

Surveys, Sampling and Observational Data (formerly STA322H1)

Summer 2025 Syllabus

Course Meetings

STA304H1 F

Section	Day & Time	Delivery Mode & Location
LEC0101	Tuesday, 2:00 PM - 5:00 PM Thursday, 2:00 PM - 5:00 PM	In Person: PB B150 In Person: PB B150

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Course Contacts

Instructor: Dr. Luai Al Labadi
Email: luai.allabadi@utoronto.ca
Office Hours and Location: Tuesday and Thursday, 1:00 PM – 2:00 PM in UC 175

Course Overview

Design of surveys, sources of bias, randomized response surveys. Techniques of sampling; stratification, clustering, unequal probability selection. Sampling inference, estimates of population mean and variances, ratio estimation. Observational data; correlation vs. causation, missing data, sources of bias.

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Course Learning Outcomes

By the end of this course, students should be able to:

1. Design a survey or sample that is appropriately gathering information of interest.
2. Carry out a variety of statistical analyses to make inference on the data collected from a survey/sample.
3. Identify and implement different sampling techniques and different study designs and the trade-offs involved in each.
4. Identify sources of bias within a study and comment on a study's design, including its weaknesses, strengths, and appropriate analyses.

5. Clearly communicate results of statistical analyses to technical and non-technical audiences.

Prerequisites: ECO227Y1/ STA255H1/ STA261H1/ STA248H1/ STA238H1/ STAB57H3/ STA258H5/ STA260H5/ ECO227Y5
Corequisites: None
Exclusions: STAC50H3, STAC53H3, STA304H5
Recommended Preparation: None
Credit Value: 0.5

Course Materials

COURSE MATERIALS

Course Content: All lecture slides, materials, and important announcements will be posted on Quercus https://q.utoronto.ca**.** Please make sure to check it regularly so you do not miss anything.

Required Textbook

- *Elementary Survey Sampling, 7th edition*, by Scheaffer, Mendenhall, Ott & Gerow
- Publisher: Cengage
- ISBN-10: 0840053614 | ISBN-13: 9780840053619
- Publication Date: 2012
- **Available as an E-book**

Additional References

- *Sampling: Design and Analysis, 2nd edition,* by Sharon L. Lohr. Cengage, ISBN 9780495105275
- Sampling Theory and Practice by Changbao and Thompson. Springer, ISBN: 978-3-030-44246-0
- *Complex Surveys: A Guide to Analysis Using R*, by Lumley. Wiley, ISBN 978-0-470-28430-8

Calculators: Handheld, **non-programmable** calculators may be used during tests/exam. Any calculator that has a logarithm, square root, and one memory button will suffice for this course, so there is no need to buy an expensive calculator.

Statistical Computing:

- This course uses the statistical package R/RStudio/Jupyterhub.

- R is free statistical software, and it can be downloaded from http//cran.r-project.org/.
- JupyterHub (https://datatools.utoronto.ca/) allows you to work with this software without having to download anything to your computer.

COURSE COMPONENTS

Lectures: Attending lectures, actively engaging with the topics, and seeking clarity on any questions are crucial aspects of succeeding in this advanced-level course. To effectively learn the material, students should make the most of the lecture time and regularly practice the concepts covered. Relying on last-minute cramming before tests/exams is unlikely to be beneficial.

Office Hours: The instructor/TAs will hold office hours as described above or on Quercus. It is recommended that you visit office hours whenever you have a question about the material. It is very important to have material clarified as quickly as possible. Do not wait until the last minute to ask your questions. Any change in office hours will be communicated on Quercus or Piazza

Piazza: This is for student-led discussion. All questions about course material should be posted here or asked during instructor/TAs office hours. The instructor and TAs will monitor the board and will help answer questions, but students are encouraged to answer posts and help their fellow classmates.

SUGGESTED PROBLEMS FROM THE TEXTBOOK: They will form the basis for the term tests and the final exam, although it does not imply that you will be tested on these problems. They will be essential for your understanding of the topics covered in class.

- **2:**2-2.5, 2.8, 2.9, 2.11, 2.12, 2.14, 2.15, 2.22, 2.25, 2.26, 2.27, 2.28, 2.29.
- **3:**1-3.8, 3.13, 3.14.
- **4:**1, 4.2, 4.4, 4.5, 4.8, 4.11, 4.14, 4.15-4.28, 4.41, 4.42, 4.47, 4.48.
- **5:**1, 5.2, 5.5, 5.13, 5.14, 5.25, 5.26, 5.32, 5.36.
- **6:**1-6.5, 6.7, 6.9, 6.10, 6.11, 6.23.
- **7:**1, 7.2, 7.4, 7.5, 7.11, 7.12, 7.16, 7.17, 7.18.
- **8:**1, 8.8, 8.9, 8.13, 8.18, 8.20, 8.23, 8.36.
- **9:**1, 9.2, 9.4, 9.7, 9.8, 9.11, 9.12.
- **10:**1, 10.5, 10.8, 10.10, 10.11, 10.13.

Marking Scheme

Assessment	Percent	Details	Due Date
Test 1	25%		2025-05-22

Assessment	Percent	Details	Due Date
Test 2	25%		2025-06-05
In-Person Final Exam	50%		Final Exam Period

- All term tests start at 3:30 pm and end at 5:00 pm on the dates specified above.
- There will be class from 2:00 pm - 3:00 pm on the day of term test.
- Your test may be in a different room. The location will be communicated on Quercus.
- For a missed term test, you do not need to provide any documentation for this course. At most once per term you can use the ACORN absence declaration, but it is not required.

If you miss one term test:

- No makeup test will be provided.
- The weight of the missed test will be transferred to the final exam, making the final exam worth 75%.

If you miss both term tests:

- A makeup test will be held on Thursday, June 12, from 5:30 pm to 7:00 pm. The location will be announced on Quercus.
- The makeup test **will be comprehensive, covering all material from the course**.
- The makeup test will count for 25% of your mark. Any unallocated weight from the missed tests (i.e., 25%) will be added to the final exam, which will then be worth 75%.
- If you do not attend the makeup test, you will receive a mark of zero, and the final exam will account for 75% of your overall mark.

Late Assessment Submissions Policy

Please see above.

Course Schedule

Lecture #	Topic	Text Reference
1	Introduction	Ch. 1
	Technical terms	2.2
	How to select a sample: The design of the sample survey	2.3
2	Sources of error	2.4
	Questionnaires & planning	2.5-2.6
	Ethics in research	

	Infinite/finite population summary statistics	3.1-3.3
	Sampling distributions, correlation & estimation	3.4-3.6
3	Simple random sampling	4.1-4.2
	Estimation of a population mean/total	4.3
4	Sample size	4.4
	Estimation of a proportion & comparing estimates	4.4-4.6
	Stratified random sampling & estimation of a mean/total	5.1-5.3
5	Selecting & allocating sample sizes	5.4-5.5
	Estimating a proportion, and selecting & allocating sample sizes for proportions	5.6-5.7
6	Optimal stratification	5.8-5.9
7	Ratio estimation	6.1-6.3
	Selecting sample size	6.4
8	Regression & difference ratio estimation	6.5-6.7
	Comparing Estimates	6.8
9	Systematic sampling & estimation of a mean/total	7.1-7.3
	Estimating a proportion, and selecting sample size	7.4-7.5
	Repeated systematic sampling	7.6
10	Cluster sampling & estimation of a mean/total	8.1-8.3
	Equal cluster sizes	8.4
	Selecting sample size & estimating a proportion	8.5-8.7
11	Two stage cluster sampling	9.1-9.2
	Estimation of a mean/total	9.3
	Ratio estimation of a mean, estimating a proportion	9.4-9.5
	Equal sized clusters & probability proportional to size	9.6-9.7
12	Estimating a population size	10.1-10.3

Policies & Statements

Email Policy

Your email must originate from your University of Toronto email account when you contact your instructor by email. The subject line should contain the course number and a relevant subject (indicating what the email is about). Be sure to include your full name and student ID number in the body of the message. Before you send an email, make sure that you are not asking for information that is already available from the course outline/website/announcements, or questions about the course material that are more appropriate for discussing during office hours or discussion board on Piazza. **In general, your instructor and TAs will not answer technical questions about the course material by email**.

Intellectual Property

Course materials provided on Quercus, such as lecture slides, recordings, assignments, tests and solutions are the intellectual property of your instructor and are for the use of students currently enrolled in this course only. Providing course materials to any person or company outside of the course is unauthorized use. This includes providing materials to predatory tutoring companies.

Use of Generative AI

In this course, students may use artificial intelligence tools, including generative AI, as learning aids. However, their use is strictly prohibited during term tests and final exam.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as a test or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Students with Disabilities or Accommodation Requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting https://studentlife.utoronto.ca/department/accessibility-services/. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters (https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at http://www.writing.utoronto.ca. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see A&S Student Academic Integrity (https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) and the University of Toronto Website on Academic Integrity (https://www.academicintegrity.utoronto.ca).

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Re-marking Policy

If you believe there is an issue with the marking, you can request a re-mark. The re-mark policy is in place to correct mistakes. Any request should clearly identify the error, such as an unmarked question or an incorrectly calculated total. Requests to correct such mistakes must be addressed by your instructor, not the TA. To be eligible for a re-marking request, you should either make the request upon collecting the paper (if the test is not marked using crowdmark) or by emailing Luai within 5 business days from when the graded test was initially available (if crowdmark is used). Ensure that the subject line of the email includes STA304, provide your full name and student ID number, and present specific, clear, and concise reasons for each request. Cite potential errors or omissions made by the marker. Re-marking requests lacking specific reasons will not be accepted. **Note that your entire test may be remarked when submitting a re-marking request. Therefore, it is possible that your mark may go down if the regraded mark is lower than your original mark.**

Recording Lectures (by Student)

This item is listed here to remind you to include your position on recording lectures in your syllabus, should you wish. Students should be reminded that lectures are the intellectual property of the instructors, and the recordings should be respected thus. For further discussion and sample text, see Section 3.2 on taping, recording and photographing lectures in the A&S Academic Handbook (https://www.artsci.utoronto.ca/faculty-staff/teaching/academic-handbook#CourseClassroomProcedures) and CTSI Guidelines on Recording Lectures and Class Sessions (http://teaching.utoronto.ca/ed-tech/audio-video/).