

# SOC252H1S: Intermediate Quantitative Methods in Sociology

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<b>INSTRUCTOR:</b>	Philip Badawy Email: philip.badawy@mail.utoronto.ca
<b>OFFICE HOURS:</b>	Tuesdays 4:00-5:00pm or by appointment Online: Zoom link in Quercus announcements
<b>TUTORIALS:</b>	Online until mid-February, and then in FE36 – 725 Spadina Avenue (basement)
<b>CLASS HOURS AND LOCATION:</b>	Tuesdays 10:10am-12:00pm Online in January, and then in LM 158
<b>TEACHING ASSISTANTS:</b>	Julia Ingenfeld Email: julia.ingenfeld@mail.utoronto.ca Office Hours: TBD  Adia Parnia Email: adia.parnia@mail.utoronto.ca Office Hours: TBD

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## COURSE DESCRIPTION AND FORMAT

### Course Description:

This course provides students with the tools to understand and investigate our social world using quantitative methods. We will begin this course with descriptive statistics and the logic behind quantitative methods to build a solid foundation to make inferences about the population using sample data. This course covers basic two-way associations and simple regression, followed by a deep dive into multiple linear regression which gives students the exposure to confounding, mediation, moderation, assumptions of ordinary least squares (OLS) regression, and diagnostic tests to reveal violations of assumptions. We will then learn about generalizing the linear regression model to incorporate logistic regression, non-linear regression, and Poisson regression models. We'll conclude the class with exploring some advanced topics in quantitative methods, including structural equation models and techniques used for longitudinal analysis. Throughout this course, students will gain valuable hands-on experience coding and analyzing data using Stata—a popular statistical software package for sociologists.

**Prerequisites:** The prerequisite to take SOC252H1 is SOC202H1 or equivalent. Students without the prerequisite can be removed at any time discovered, and without notice.

**Student Learning Outcomes:** By the end of the course, you will be able to...

- Demonstrate the logic of quantitative methods used by sociologists
- Understand the fundamentals of multiple linear regression, including confounders/mediators/moderators, its key assumptions, and diagnostic tests
- Understand extensions to the linear regression model, including logistic regression, non-linear regression, and Poisson regression models
- Gain experience in coding and analyzing data using Stata (statistical software)
- Gain exposure to advanced topics in quantitative methods, including structural equation modeling and longitudinal analysis

### COURSE REQUIREMENTS

**Readings:** All assigned readings will be available on Quercus. You do not need to purchase any textbook or other readings.

**Class Format:** Classes will be delivered **in-person** on Tuesdays from 10:10am-12pm in LM 158. All classes will highlight the central concepts and logic in statistics and will elaborate upon them with examples. Students are required to have completed any assigned materials before class and be prepared to engage in a discussion.

### EVALUATION COMPONENTS

Description	Date	% of Grade
Assignment 1	February 1	15
Assignment 2	February 15	15
Midterm	March 1	30
Assignment 3	March 22	15
Final Test	April 5	25

### DETAILS ON EVALUATION COMPONENTS

#### (1) Assignment 1 (15%)

Assignment 1 is due on February 1. It will be on descriptive statistics and testing group differences, which will involve data analysis in Stata and interpretation. More details about assignment 1 will be shared in Week 2 (Tuesday January 18) and in Tutorial 1 (Thursday January 20 or Friday January 21).

If you choose to submit corrections for this assignment, they are due on Tuesday March 1.

#### (2) Assignment 2 (15%)

Assignment 2 is due on February 15. It will be on simple and multiple regression, which will involve data analysis in Stata and interpretation. More details about assignment 2 will be shared in Week 4 (Tuesday February 1) and in Tutorial 2 (Thursday February 3 or Friday February 4).

If you choose to submit corrections for this assignment, they are due on Tuesday March 8.

### **(3) Midterm (30%)**

The midterm test will take place during class on March 1. The midterm will cover material from all classes for Week 1 to Week 6. It will include multiple choice and short answer questions. More details about the midterm will be shared in Week 6 (Tuesday February 15) and a midterm review will be held in Tutorial 3 (Thursday February 17 and Friday February 18).

### **(4) Assignment 3 (15%)**

Assignment 3 is due on March 22. It will be on elaborating OLS regression (e.g., mediation and moderation) and logistic regression, which will involve data analysis in Stata and interpretation. More details about assignment 3 will be shared in Week 8 (Tuesday March 8) and in Tutorial 4 (Thursday March 10 or Friday March 11).

If you choose to submit corrections for this assignment, they are due on Tuesday April 12.

### **(5) Final test (25%)**

The final test will take place during class on April 5. The final test will cover material from all classes, with heavier emphasis on Week 8 to Week 11. It will include multiple choice and short answer questions. More details about the final test will be shared in Week 11 (Tuesday March 29) and in Tutorial 5 (Thursday March 31 or Friday April 1).

## **COURSE POLICIES**

### **(1) Communication:**

**Office hours.** Please don't hesitate to ask questions about the course material during my online office hours (Tuesdays 4:00pm-5:00pm). If you would like to meet but cannot make it to my office hours, please email me to set up an alternative time.

**Email.** Students must use their @mail.utoronto.ca email address to communicate with me. I will do my best to respond to your emails within 24 hours, excluding weekends. However, I will not respond to emails about issues that are clearly specified in the syllabus (e.g., "how much is assignment X worth?"). All emails must include the course code (SOC252) in the subject line. Please write your emails in a professional manner by proofreading and using appropriate language. When contacting faculty members, it is good practice to open with a professional greeting (e.g. "Dear Professor X"). Please use full sentences, be coherent and sensible, and sign your name at the end.

**(2) Corrections:** Students have the opportunity to submit corrections for **ONE** assignment of their choice. These corrections will be worth **half marks**. For instance, if a student submits corrections for an assignment they originally scored 10/20 for, they have the potential to earn a total of 5 out of the 10 marks they missed, so they could bring their original 10/20 score to a score of 15/20 (earning a 75% on the assignment instead of 50%).

### **(3) Grade Appeals**

I take the marking of assignments very seriously, and will work diligently to be fair, consistent, and accurate. Nonetheless, mistakes and oversights occasionally happen. If you believe that to be the case, you must adhere to the following rules:

1. If it is a mathematical error, simply alert me of the error
2. In the case of more substantive appeals, you must:
  - a. Wait at least 24 hours after receiving your mark
  - b. Carefully re-read your assignment, all assignment guidelines, marking schemes, and my comments.

All students may review their tests or assignments with me or the teaching assistant during office hours.

If you wish to appeal:

1. You must submit to me a written explanation of why you think your mark should be altered. Please note statements such as “I need a higher grade to apply to X” are not compelling. Also, **please note that upon re-grade your mark may increase, decrease, or remain the same.**
2. Attach to your written explanation your original assignment, including all of the original comments.

#### **(4) Accommodations**

##### **Missed Tests**

Students who miss a test will receive a mark of zero for the test unless reasons beyond their control prevent them from taking it. Within 48 hours of the missed test, students who wish to write the make-up test must send me a request for special consideration that explains why the test was missed. Students who miss the test, or are late in submitting an assignment for medical reasons, need to email the instructor (not the TA), and also declare their absence on the system (ACORN). (NOTE: Because of Covid-19, students do NOT need to submit the usual documentation, i.e., medical notes or the Verification of Illness forms).

Students who miss the test, or are late in submitting an assignment for other reasons, such as family or other personal reasons, should request their College Registrar to email the instructor.

##### **Late Assignments**

Late assignments for reasons that are within your control will be reduced by **10% for every day late (including weekends)**. Late assignments will not be accepted after December 1. Late assignments should be submitted via Quercus using the normal submission procedure for the assignment in question.

##### **Accommodated Testing Services**

If you require accommodations for tests/exams, please visit this site as soon as possible to register: <https://lsm.utoronto.ca/ats/>

#### **(5) Academic Integrity**

Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves.

Cheating and misrepresentation will not be tolerated. Students who commit an academic offence face serious penalties. Avoid plagiarism by citing properly: practices acceptable in high school may prove unacceptable in university. Know where you stand by reading the “Code of Behaviour on Academic Matters” in the Calendar of the Faculty of Arts and Science.

Familiarize yourself with the University of Toronto’s Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>). It is the rule book for academic behaviour at U of T, and you are expected to know the rules.

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the *Code*. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact me. If you have questions about appropriate research and citation methods, seek out additional information from us, or from other available campus resources like the [U of T Writing Website](#). If you are experiencing personal challenges that are having an impact on your academic work, please seek the advice of your college registrar.

#### **(6) Accessibility**

The University of Toronto is committed to accessibility. If you require accommodations or have any accessibility concerns, please visit <https://studentlife.utoronto.ca/task/register-with-accessibility-services/> as soon as possible.

#### **(7) Equity, Human Rights, and Respect for Diversity**

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.

#### **(8) Privacy and Use of Course Materials**

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other source depending on the specific facts of each situation, and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor. For questions about recording and use of videos in which you appear please contact your instructor.

## COURSE OUTLINE

### Week 1 (January 11): Introduction to Descriptive Statistics

- Common terminology
- Levels of measurement
- Measures of central tendency
- Measures of dispersion
- Review syllabus
- Introduction to Stata

Required reading:

- Fisher, Murray, J., and Andrea P. Marshall. 2009. "Understanding Descriptive Statistics." *Australian Critical Care* 22:93-97.

### Week 2 (January 18): From Descriptive to Inferential Statistics

- Normal distribution
- Sampling distribution
- Tests for means and proportions
- Confidence intervals
- Significance tests

Required reading:

- Raftery, Adrian. E. 2001. "Statistics in Sociology, 1950-2000: A Selective Review." *Sociological Methodology* 31:1-45.

**Tutorial 1 this week: Thursday (4-6pm) January 20 or Friday (10am-12pm) January 21**  
**Assignment 1 is due February 1**

### Week 3 (January 25): Linear Regression I

- Associations and correlations
- Simple regression

Required Reading:

- Illowsky, Barbara, and Susan Dean. 2012. *Collaborative Statistics*. Texas: Connexions. **Chapter 12** (12.1-12.9: pages 523-548).

### Week 4 (February 1): Linear Regression II

- Multiple regression
- Confounding

Required Reading:

- Allison, Paul, D. 1998. *Multiple Regression: A Primer*. California: Pine Forge Press. **Chapter 1** (pages 1-25) and **Chapter 2** (pages 25-31).

**Assignment 1 is due today (Tuesday February 1)**

**Tutorial 2 this week: Thursday (4-6pm) February 3 or Friday (10am-12pm) February 15**  
**Assignment 2 is due February 15**

**Week 5 (February 8): Linear Regression III**

- Mediation
- Moderation

Required Reading:

- <http://davidakenny.net/cm/mediate.htm> (read Introduction, The Four Steps, and Indirect Effect)
- Class notes posted to Quercus

**Week 6 (February 15): Linear Regression IV**

- OLS assumptions
- Diagnostics

Required Reading:

- <https://people.duke.edu/~rnau/testing.htm>

**Assignment 2 is due today (February 15)**

**Tutorial 3 this week: Thursday (4-6pm) February 17 or Friday (10am-12pm) February 18**  
**Midterm on March 1**  
**Extra time used for corrections on Assignment 1**

**(February 22): READING WEEK- No class**

**Week 7 (March 1): MIDTERM**

- Midterm in-class
- Worth 30%
- Multiple choice and short answer questions

**Corrections for Assignment 1 due today (March 1)**  
**Lab drop-in (Thursday March 3 or Friday March 4)**

**Week 8 (March 8): Generalizing the Linear Regression Model I**

- Logistic regression models

Required Reading:

- Morgan, Philip, S., and Jay D. Teachman. 1988. "Logistic Regression: Description, Examples, and Comparisons." *Journal of Marriage and Family* 50(4):929-936.

**Corrections for Assignment 2 due today (March 8)**

**Tutorial 4 this week: Thursday (4-6pm) March 10 or Friday (10am-12pm) March 11**

## Assignment 3 is due March 22

### Week 9 (March 15): Generalizing the Linear Regression Model II

- Non-linear regression
- Poisson regression models

#### Required Reading:

- Class notes posted to Quercus

### Week 10 (March 22): Advanced Quantitative Methods I: Structural Equation Modeling

- Latent variables
- Effect decomposition
- Fit statistics

#### Required Reading:

- Alwin, Duane, F., and Robert M. Hauser. 1975. "The Decomposition of Effects in Path Analysis." *American Sociological Review* 40(1):37-47.

## Assignment 3 is due today (Tuesday March 22)

### Week 11 (March 29): Advanced Quantitative Methods II: Longitudinal Data Analysis

- Lagged effects
- Fixed effects models
- Event history analysis

#### Required Reading:

- Allison, Paul, D. 2009. *Fixed Effects Regression Models*. Los Angeles: Sage. **Chapter 1 and Chapter 2** (pages 2-27)

**Tutorial 5 this week: Thursday (4-6pm) March 31 or Friday (10am-12pm) April 1**  
**Final test next week**

### Week 12 (April 5): Final Test

- Final test in-class
- Worth 30%
- Multiple choice and short answer questions

**Lab drop-in (Thursday April 7 or Friday April 8)**  
**Corrections for Assignment 3 due Tuesday April 12**