SOCIOLOGY 252 H1F:

INTERMEDIATE QUANTITATIVE METHODS IN SOCIOLOGY

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Department of Sociology
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Class time: Tuesday 1–3
Place: **UC 85**

Tutorial time: Thursday 11–1 or 3-5 (NOT weekly)
Place: 17198 (17th floor, 1700 University)

Website: Quercus

Calendar Description

Provides students with the opportunity to develop an understanding of the logic of multivariate analysis by applying various strategies for the analysis of complex multivariate data.

Prerequisites

SOC202H1 or equivalent. Students without this/these prerequisite/s will be removed at any time discovered and without notice.

Overview

This course is a follow-up to a first methods course that includes some introduction to descriptive and inferential statistics and the logic of multivariate analysis. We begin by going back to go forward, reviewing some material on the fundamental building blocks of statistical theory and statistical inference.

We will look at tables to establish the nature of association and the logic of controlling for variables, and then introduce regression and correlation, followed by multiple regression.

Multiple regression is a (almost) universal technique used in most disciplines that apply quantitative data: it is very flexible, and accommodates most styles of thinking and theorizing.

Near the end of the course, we will consider the extensions of this model that reflect its flexibility, including interaction effects between variables (intersections), nonlinear relationships, and models for categorical outcomes.

Required Work

Assignments

There will be two computer assignments, in which you will analyze data I provide. The first assignment will be on cross-classification and tables; the second will use multiple regression. Both the TA and I will teach the use of SAS in tutorials to use in these assignments.

Both assignments will be done in pairs. You will form pairs voluntarily. Grades will be given at the group level and will apply equally to both students.

The data you will use for assignments will be described in tutorials. There will be some minimal programming your group will do, depending on your choice of variables from the data provided, but I will post very specific templates for what you need to do, so that you can just edit these template programs by simply replacing the variables in my template with yours.

We will not hold tutorials every week. Tutorials will be held on scheduled weeks in the course; these weeks are listed in the class schedule below. In general tutorials are held on weeks prior to due assignments and before tests.

We will also use tutorials to go over the details of assignment questions and to do reviews of test questions in the weeks before required work is due.

Because tutorials are not held every week, both the TAs and I will be available for individual meetings you schedule by email. This is to ask questions about class material or assignments.

Assignments are written up as short papers meant to analyze a specific research question, following the requirements of the question(s) in the assignment. **Each assignment *must* include the following:**

1. Your names on the first page and course code.
2. For each step of the assignment, all SAS syntax (code) and results/output (tables) embedded into the write-up for that section. This can be done by copy/pasting content from SAS directly into the document.

3. Your entire SAS program (code) and all output produced by your program appended at the end of your assignment.

Tests

There will be an in-class term test, and a final exam during the scheduled final exam period. The term test will focus on problems, including some calculation and/or interpretation. ***This test will be held in the tutorial room.*** For that week, we will try to arrange a single sitting for the test at 3-5 on Thursday. If this is a problem, let us know.

The final exam is non-cumulative, and will include material only from the section on correlation and regression forward. I will hand out some practice questions for tests and the final exam.

The term test and final exam are ***open book***. The meaning of "open book" will vary somewhat between the test and the final. For the test, you will have notes relevant to the test based on posted readings. For the final, we would normally allow the assigned text, but this requires all students to have purchased the text. Instead, we will provide a complete copy of all ***relevant*** slides used in class after the test. You can use your phone for calculations on the test, but you must use a calculator at the final exam, since phones are not allowed.

In-Class Questions

There will be posted questions at the end of many classes, with the opportunity to answer the question in real time on Quercus. We will review answers to these questions at the end of each class. You will be given grades for being there and for attempting to answer the question that week. However, you only need to answer a question in 8 out of the last 10 weeks to get the full grade. Whether you answer the question correctly won't matter to the grade. You will receive one point off for each class quiz you miss less than 8.

You ***must*** be physically present in class to receive credit for answering the question(s). Obtaining or providing unauthorized assistance to classmates, including sharing the quiz password with others, is prohibited and submissions from off-campus IP addresses will be flagged by Quercus.

Due Dates and Weights for Required Work

Assignments will be submitted online to the course site on Quercus. They should be submitted using Word. Assignments will be due on the due date before 9 PM.

Provisional due dates for required work are as follows:

Work	*Due Date*	*Weight*
1. First Assignment	Friday, October 10	20%
2. Term Test	Thursday, October 16	20%
3. Second Assignment	Thursday, November 20	20%
4. In-class ***participation*** on 8 of 10 questions in 10 weeks	Last 10 Weeks of Class	10%
5. Final Exam	Final Exam Period	30%

Note: Late assignments will be given a 10% reduction in the grade immediately. This means that the assignment will be given a weight equal to .90 of the assigned weight. This increases to 20% if the assignment is late more than 3 school days. Assignments will only be accepted if they are submitted before 7 school days after the due date. After that, your grade will be zero on that part of the course.

Software

This year, this class will use the free online version of SAS OnDemand. You will be able to use SAS through your laptop's web browser, whether a PC or a Mac. We will post instructions about accessing and setting up SAS OnDemand on Quercus.

Also: *if and only if you already have some experience and knowledge of R,* you will be able to use R on assignments. Template programs in R will be posted.

Data

We will use a specific data set for assignments: the 2015 General Social Survey for Canada. This is a long-term survey run every year by Statistics Canada on a representative sample of Canadians 15 and over. The sample size is 27,695.

We will provide derived versions of these data with already constructed variables, but we will also include the raw variables used to create the constructed variables so that you can create your own variables as well. This will be a choice you make: if you don't want to learn extra programming on the second assignment, you can use already constructed variables.

Quercus

Quercus will be used in this course for three purposes: 1) I will post data, assignments, code examples, and course readings there; 2) I will post most lecture PowerPoint materials there—when they are presented in class; and 3) I will post in-class questions there that you can answer in real time at the end of class.

I will use the quiz feature within the course site in class to ask questions. The class will answer the questions online, anonymously, and we will see the results live. This is important in this kind of class: issues in understanding material should be addressed at the time, rather than weeks later.

Readings

Required Reading

Required reading will occur in two forms in this class, and in sequence. We start with a set of notes I will post online, week by week, following the topics of the first four weeks. These notes cover the "review" part of the course, and are relevant over the first four weeks only.

After the first four weeks, you will be expected to read assigned sections from this textbook, recently published and available online:

> **Wheaton, Blair, and Marisa Young. 2021. *Generalizing the Regression Model: Techniques for Longitudinal and Contextual Analysis*. Thousand Oaks, CA: Sage.**

Note: This text is for a range of second courses in statistics, and we will only be dealing with sections of Chapters 1, 2, 3, 4, and 5.

Optional Reading Online

This course includes optional material that could be helpful as backup. None of these readings are required. These readings are available for download in Quercus.

Brambor, Thomas, William Roberts Clark, and Matt Golder. 2005. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 13:1–20.

Illowsky, Barbara, and Susan Dean. 2013. *Introductory Statistics*. Houston, TX: OpenStax.

Peng, Chao-Ying Joanna, Kuk Lida Lee, and Gary M. Ingersoll. 2002. "An Introduction to Logistic Regression Analysis and Reporting." *The Journal of Educational Research* 96(1):3–14.

Schroeder, Larry D., David L. Sjoquist, and Paula E. Stephan. 1986. *Understanding Regression Analysis: An Introductory Guide*. Newbury Park, CA: Sage.

Sykes, Alan O. 1993. "An Introduction to Regression Analysis." *Coarse-Sandor Institute for Law & Economics* Working Paper No. 20. Chicago, IL: University of Chicago Law School.

The class schedule includes references to these online sources and to posted articles which will supplement the notes used in class. You should especially read introductory articles for multiple regression and logistic regression. They are intended as basic introductions for audiences who know nothing about these topics.

Student Accommodations

Please see me or email me if you have a registered accommodation so that we are aware of any special issues that apply in your case.

Missed Deadlines or Tests

Students who miss an assignment deadline or a test will receive a mark of zero for that paper or test unless the reason is a circumstance beyond their control. Within three days of missing an assignment deadline or test, students must send the instructor a request for consideration. Students must document their request with one of the following:

- Absence declaration via ACORN (can only be used once during the semester)
- U of T Verification of Illness or Injury Form
- College Registrar's letter (e.g., in case of personal/family crisis or emergency)
- Letter of Academic Accommodation from Accessibility Services 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.

Term Test: If you miss the term test, you must follow one of the procedures above to qualify for a make-up test. The TA will ***not*** run a make-up test separately for each individual. There will be one sitting arranged for all qualified students for a make-up test.

COVID-19 Contingencies

Do not attend class if you have COVID-19 or if you are experiencing symptoms consistent with COVID-19. In case of illness or suspected illness, you should declare your absence on ACORN and contact a TA immediately to discuss options for completing coursework while ill.

Academic Integrity

Students are expected to know and adhere to the University's principles of academic integrity. Any act of plagiarism or other unethical behavior will be addressed in accordance with University guidelines. Students should be aware that turning in an old paper, or large parts thereof, for credit in a second course, is considered an academic offense. Please see the "Code of Behaviour on Academic Matters"

(http://www.governingcouncil.utoronto.ca/policies/behaveac.htm) for specific information on academic integrity at the U of T.

Appointments

I encourage you to email me to arrange an appointment at any time. I am in my office on most days. But, in general, I will be in my office from 3-4 on Tuesday after this class, if you want to stop by.

I will designate special office hours in the weeks before assignments are due, to be announced later. You may also arrange an appointment with a TA by sending her an email.

You are not burdening us by meeting with us outside of class hours—we have carved out time specifically so you can talk to us. The primary purpose of appointments is to help you better understand the course content, assignments, and tests.

Re-Marking

We will use specific marking keys for both assignments and tests. Those keys define the universe of possible answers and possible variations in those answers. In a course such as this, the only issue that may come up is a mistake in applying the key to the answers in specific cases. If there is a mistake in an assignment or test you get back, you should see the TA ***within two weeks of your receipt of the test or assignment***. In general, we will not consider work for re-grading after feedback on a later test or assignment, unless it is in this two week period.

Note that your grade after re-marking can remain the same, or increase, or decrease.

Class Schedule and Readings

Date	*Day*	*Topic / Work*	*Readings*
September 2	Tuesday	**1. Overview: Review of Descriptive Statistics**	**Class Notes: Basic Statistics Review sections:** **1. Measurement** **2. Sampling** **3. Descriptive Statistics** **Illowsky and Dean, *Introductory Statistics*:** **1. Data and Sampling 1.2** **1. Measurement and Tables 1.3, 1.6.** **2. Descriptive Statistics 2.5 to 2.8**
September 9	Tuesday	**2. Probability and Inference**	**Class Notes: Review of Basic Statistics sections:** **4. Introduction to Probability** **5. Probability and Sampling Distributions** **6. More Sampling Distributions** **7. Tests of Hypotheses** **Illowsky and Dean, *Introductory Statistics*:** **3. Probability 3.1 to 3.3, 3.5** **5. Continuous Random Variables 5.1 and 5.2** **6. The Normal Distribution 6.1 to 6.6** **7. The Central Limit Theorem 7.1 to 7.5** **9. Hypothesis Testing 9.1 to 9.4, 9.7 to 9.10**
September 16	Tuesday	**3. Cross-Classification: Studying Association in Tables**	**Class Notes: Cross-Classification sections:** **1. Bivariate Associations** **2. Measures of Association in Tables** **Illowsky and Dean, *Introductory Statistics*:** **4. Contingency Tables 3.4**
September 18	Thursday	**Tutorial: Intro to SAS**	
September 23	Tuesday	**4. Multivariate Tables**	**Class Notes: Cross-Classification section:** **3. Multivariate Tables**

Date	*Day*	*Topic / Work*	*Readings*
September 25	Thursday	**Tutorial: SAS Procedures, Class Data, Assignment #1**	
September 30	Tuesday	**5. Introduction to Correlation and Regression**	**Wheaton and Young, Chapter 1: Review of Correlation and Regression:** **1.1 to 1.6** Schroeder et al., *Understanding Regression Analysis*: **Chapter 1: Linear Regression** Sykes, *An Introduction to Regression Analysis*: **Pp. 1–7**
October 7	Tuesday	**6. Multiple Regression**	**Wheaton and Young, Chapter 1: Review of Correlation and Regression:** **1.7 and 1.8** Schroeder et al., *Understanding Regression Analysis*: **Chapter 2: Multiple Regression** Sykes, *An Introduction to Regression Analysis*: **Pp. 7–17**
October 9	Thursday	**Tutorial: Test Review**	***Tutorial room, 17198 Sociology***
October 10	Friday	**Assignment #1 Due**	
October 14	Tuesday	**7. Interpretation of Results: An Introduction to Models**	**Wheaton and Young, Chapter 6: From Equations to Models:** **6.1 to 6.6, 6.9**
October 16	Thursday	**Term Test**	***Tutorial room, 17198 Sociology***
October 21	Tuesday	**8. Dummy Variables in Regression**	**Wheaton and Young, Chapter 1: Dummy Variables:** **1.9** Schroeder et al., *Understanding Regression Analysis*: **Chapter 4: Dummy Variables**
October 27-31		**Reading Week**	
November 4	Tuesday	**9. Regression Extensions: Interactions I**	**Wheaton and Young, Chapter 2: Interactions:** **2.1. Continuous x Categorical Interactions**

Date	*Day*	*Topic / Work*	*Readings*
			Brambor et al., *Understanding Interaction Models*: **Pp. 1–11**
November 6	Thursday	**Tutorial: Assignment 2**	
November 11	Tuesday	**10. Regression Extensions: Interactions II**	**Wheaton and Young, Chapter 2: Interactions:** **2.2 to 2.4, 2.6**
November 13	Thursday	**Tutorial: Assignment 2**	
November 18	Tuesday	**11. Regression Extensions: Nonlinear Regression**	**Wheaton and Young, Chapter 3: Nonlinear Regression:** **3.1 to 3.4.1 (not 3.4.2), 3.7**
November 20	Thursday	**Assignment #2 due; Tutorial: Final Exam Review**	
November 25	Tuesday	**12. Models for Categorical Outcomes**	**Wheaton and Young, Chapter 4: Logistic Regression** **4.1 to 4.4, 4.9** **Peng et al., *Introduction to Logistic Regression:*** **Pp. 1–9**