



## Department of Sociology

SOC504 – Winter 2024

Topics in Advanced Quantitative Methods for Sociological Research

Professors: Dr. Nicole Denier and Dr. Michelle Maroto

### Course Description & Objectives

This course provides a survey of advanced quantitative methods for sociological research. We begin with an overview of the logic of causal inference in quantitative and population research, and then move to discussing methods for analyzing common survey and administrative data, including multiple linear regression, models for binary and count outcomes, and hierarchical and longitudinal models. Students will come away with deepened understanding of cutting-edge quantitative methods, familiarity with population data and attendant infrastructures in Canada and the U.S., and programming skills in R and Stata.

### Class & Reading Schedule

Week	Date	Topic	Assignment
1	Jan. 12	Intro (Class Goals; Stata + R)	--
2	Jan. 26	The Logic of Causal Order	--
3	Feb. 9	Multiple Linear Regression	#1
4	Mar. 1	Logistic Regression	--
5	Mar. 15	Multinomial and count models	#2
6	Apr. 5	Longitudinal data analysis	--
7	Apr. 12	Longitudinal data analysis	#3

### Course Requirements and Evaluation

You will be evaluated through weekly lab assignments, a final project proposal and final project.

Assignment	% of Final Grade
Lab assignments (3 x 20%)	60%
Final Project Proposal	10%
Final Project	30%

Lab assignments will consist of applied exercises that build on examples from class, using R or Stata with real world data sets. The final project will require students to come up with a research question that can be answered using one of the methods learned in the class with appropriate population data.

## Course Plan and Readings

### **Textbooks:**

The course will draw from a variety of materials for meeting and references. In addition to the specific weekly readings, we will rely on the following textbooks as key resources:

Gelman, Andrew, Jennifer Hill, and Aki Vehtari. 2022. *Regression and Other Stories*. PDF, Data, and Examples available: [avehtari.github.io/ROS-Examples](https://avehtari.github.io/ROS-Examples).

Grolemund, Garrett and Hadley Wickham. 2023. *R for Data Science, 2nd Edition*. Book and examples available: [r4ds.hadley.nz](https://r4ds.hadley.nz).

Morgan, Stephen L. 2013. *Handbook of Causal Analysis for Social Research*. Springer. [\\*Link\\*](#)

Singer, Judith D. and John B. Willett. 2003. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. OUP. Available with library access: [\\*Link\\*](#)

### **1. Introduction**

- Topics:
  - Discussion of class goals
  - Intro to Stata and R

### **2. The Logic of Causal Order**

- Topics:
  - Causality and causal order
  - Mediation and moderation
- Readings:
  - Davis, James A. 2011. *The Logic of Causal Order*. SAGE. [\\*Link\\*](#)

### **3. Multiple Linear Regression**

- Topics:
  - Bivariate and multivariate regression
  - Regression assumptions
  - Different variable types (transformations, categorical variables)
- Readings:
  - Gelman, Hill, and Vehtari - Part 2, Chs. 6-12
  - Lewis-Beck, Colin and Michael Lewis-Beck. 2016. *Applied Regression: An Introduction*. SAGE. [\\*Link\\*](#)
  - Waite, Sean and Nicole Denier. 2015. Gay Pay for Straight Work: Mechanisms Generating Disadvantage. *Gender & Society*, 29(4), 561-588. [\\*Link\\*](#)

#### 4. Logistic Regression

- Topics:
  - Generalized linear models
  - Maximum likelihood estimation
  - Logit and probit regression
- Readings:
  - Gelman, Hill, and Vehatari - Part 3, Chs. 13-14
  - Pampel, Fred C. 2021. *Logistic Regression: A Primer*. SAGE. [\\*Link\\*](#)
  - Mood, Carina. 2010. Logistic Regression: Why We Cannot Do What We Think We Can Do, and What We Can Do About It. *European Sociological Review* 26(1), 67-82. [\\*Link\\*](#)

#### 5. Multinomial and count models

- Topics:
  - Generalized linear models
  - Multinomial and ordered logistic regression
  - Count data and associated models
- Readings:
  - Gelman, Hill, and Vehatari - Part 3, Ch. 15
  - Fogarty, Brian J. 2023. *Quantitative Social Science Data with R, 2<sup>nd</sup> Edition*. SAGE. Chs. 13-14.
  - Maroto, Michelle, Delphine Brown, and Guillaume Durou. 2023. Is Everyone Really Middle Class? Social Class Position and Identification in Alberta. *Canadian Review of Sociology* 60(3):336-366. [\\*Link\\*](#)

#### 6. Longitudinal data analysis: Part 1

- Topics:
  - Time series data
  - Fixed and random effects models
- Readings:
  - Allison, Paul D. 2009. *Fixed Effects Regression Models*. SAGE. [\\*Link\\*](#)
  - Firebaugh, Glenn, Cody Warner, and Michael Massoglia. 2013. Fixed Effects, Random Effects, and Hybrid Mixed Effects for Causal Analysis. Ch. 7 in *Handbook of Causal Analysis for Social Research*. Springer. [\\*Link\\*](#)
  - Levanon, Asaf, Paula England, and Paul Allison. 2009. Occupational Feminization and Pay: Assessing Causal Dynamics Using 1950-2000 U.S. Census Data. *Social Forces*, 88(2):865-892. [\\*Link\\*](#)
  - Budig, Michelle J. and Paula England. 2001. The Wage Penalty for Motherhood. *American Sociological Review* 66(2):204-225. [\\*Link\\*](#)

## 7. Longitudinal data analysis: Part 2

- Topics:
  - Growth curve models
- Readings:
  - Preacher, Kristopher J., Aaron L. Wichman, Robert C. MacCallum, and Nancy E. Briggs. 2008. *Latent Growth Curve Modeling*. SAGE. [\\*Link\\*](#)
  - Curran, Patrick J., Khawla Obeidat, and Diane Losardo. 2010. Twelve Frequently Asked Questions About Growth Curve Modeling. *Journal of Cognitive Development* 11(2):121-136. [\\*Link\\*](#)

### Grading

Marks for graded course requirements are given in percentages, to which letter grades are assigned, according to the table below. The percentage mark resulting from all graded components produces the final letter grade for the course. Marks for grades are not curved or scaled, but will be rounded up to the next whole percentage point.

Letter	%	Points	Descriptor
A+	95-100	4.0	Excellent
A	90-94	4.0	
A-	85-89	3.7	
B+	80-84	3.3	Good
B	75-79	3.0	
B-	70-74	2.7	
C+	66-69	2.3	Satisfactory
C	62-65	2.0	
C-	58-61	1.7	
D+	54-57	1.3	Poor
D	50-53	1.0	Minimal Pass
F	0-49	0.0	Fail

### Course and University Policies

#### Absences & Grading

Regular course attendance is crucial to learning. Consult the [Attendance](#) section of the University Calendar regarding absences that may be excusable and procedures for addressing course components missed as a result.

#### Absence from Term Work

Students are required to contact me within two working days following the missed exam or term work (or as soon as possible, considering the circumstances) to apply for an excused absence. Excused absences are not automatic and are at my discretion. Below is a list of acceptable documentation to support an absence:

- For incapacitating medical illness, students can present one of the following:
  - A note signed by a doctor (this cannot be required, but must be accepted if provided in lieu of other documents).
  - “[Request for Excused Absence or Deferral of Term Work](#)” Faculty of Arts form
- For all other cases, such as domestic afflictions or religious convictions, the student should submit documentation appropriate to the situation. This could include the following:
  - For a death in the family – a copy of the death certificate
  - For a religious conflict – a letter from the church or pastor
  - For a car accident – a copy of the accident report
  - For other serious afflictions – consult the Instructor or Department about appropriate documents

**Student Resources:** The best all-purpose website for student services is: [www.ualberta.ca/current-students](http://www.ualberta.ca/current-students).

**Accommodations + Accessibility Resources:** The University of Alberta is committed to creating work and learning communities that inspire and enable all people to reach their full potential. Accessibility Resources promotes an accessible, inclusive, and universally designed environment. For general information or to register for services visit [Academic Accommodations](#).

**Learning and Working Environment:** The Faculty of Arts is committed to ensuring that all students, faculty and staff are able to work and study in an environment that is safe and free from discrimination and harassment. It does not tolerate behaviour that undermines that environment.

**Land Acknowledgement:** The University of Alberta acknowledges that we are located on Treaty 6 territory, and respects the histories, languages, and cultures of the First Nations, Métis, Inuit, and all First Peoples of Canada, whose presence continues to enrich our vibrant community.

**Academic Integrity:** “The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (on the [University Governance website](#)) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.”

All students should consult [the Academic Integrity website](#). If you have any questions, ask your instructor.

**Audio or Video Recording:** Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the Instructor or as a part of an approved accommodation plan. Student or Instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s). This includes virtual spaces.

**Course Outline Policy:** “Policy about course outlines can be found in [Course Requirements, Evaluation Procedures and Grading](#) of the University Calendar.”