

Sociology 9007B: Advanced Multivariate Statistical Analysis

Winter Term 2021

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Class Meetings: Held virtually on Mondays 9:30am – 12:20pm

Office Hours: Held virtually on Fridays from 12pm – 1:30pm.

Course Description

This course builds on concepts you have learned in your introductory undergraduate or graduate statistics classes. We will cover some of the most common statistical techniques in the practice of quantitative sociology. These include multivariate linear regression, logistic regression, survival analysis (event history analysis), and fixed effects models. We will discuss when and how to use these techniques, as well as the assumptions we make when using them. We will also spend time discussing various pitfalls and extensions to these approaches, including outliers, nonlinearity, multicollinearity, and interaction terms. Throughout the course, we will talk about how to develop an answerable research question, how to select the best modeling strategy for that question, and how to interpret the results of quantitative analysis in light of our hypotheses.

We will apply these concepts in the computer lab. We will conduct data analysis using STATA, a commonly-used statistical analysis software package. We will talk through basic issues that come up such as dealing with missing data; saving data, code, and output; and making tables.

Finally, we will focus on writing about and presenting on a multivariate analysis of your choosing. A major component of being a quantitative social scientist is the ability to clearly communicate what you did, what you found, and why it matters. Your final project, which you should begin thinking about early in the term, will consist of a paper and accompanying poster that includes the introduction, data and methods, findings, and discussion sections of an academic article.

Prerequisites

Students should have taken an introductory statistics course at the graduate level that covers descriptive statistics, probability, bivariate regression, ANOVA, and linear regression.

Learning Outcomes

1. Understand the assumptions made when using linear regression, logistic regression and survival analysis.
2. Interpret key results from multivariate models.
3. Conduct analyses using Stata.
4. Critically evaluate published sociological research using the methods we cover.
5. Communicate about the results of your analyses.

Course Materials

Readings: There is no required textbook that you must purchase for this course.

Recommendations for reference books you might find useful are listed below.

Note: I am working with the UWO librarians to get as many of the readings available online before the term as possible. It's my goal that you won't have to spend much (any?) money on books.

Books you may already own from Introductory Statistics

- Agresti, Alan and Barbara Finlay. 2009. *Statistical Methods for the Social Sciences*, 4th edition. Pearson Prentice Hall.

These are good reference materials for your work

- Gordon, Rachel A. 2010. *Regression Analysis for the Social Sciences*. Routledge Press.
- Long, J. Scott (1997). *Regression Models for Categorical and Limited Dependent Variables*. SAGE Publications, Inc.

Books I recommend reading

- Allison, Paul D. 1999. *Multiple Regression: A Primer*. Pine Forge Press.
- Miller, Jane E. 2005. *The Chicago Guide to Writing about Multivariate Statistics*. University of Chicago Press.
- Allison, Paul. (2000). *Fixed effects regression models*. SAGE Publications, Inc.
- Pampel, Fred C. 2000. *Logistic Regression: A Primer*. Thousand Oaks, California. Sage Publications.

The readings from the above textbooks listed in the course schedule are optional but highly recommended. The empirical example readings, sociological articles that use the techniques we learn, are mandatory. These will be available on OWL and they are listed on the day by which you need to have read them. We will spend a portion of most classes discussing how the methods are used in them.

Stata: Throughout the course, we will practice using the statistical package Stata. While you are welcome to purchase your own copy of Stata, you should not need to. There are some funds available in the department to purchase statistical software (Contact Sandra). Stata is accessible on your personal computer using MyVLab (follow the set-up instructions at <https://myvlab.uwo.ca/>). While Stata is not on the list of available software at this website, you should have access to it as a Social Science student through a shortcut on the MyVLab Desktop.

If you would like to use Stata in one of the Social Science computer labs, you should have a computer account with SSNDS. In order to access Stata in the lab, students must: (1) have active Western accounts, and (2) have subscribed to “Western Identity Manager” and synchronized their passwords through the “Profile” tab. If you are having trouble gaining access, please call either the SSNDS main office (519-661-2152) or the ITS Help Desk (519-661-3800)

Evaluation

- Midterm exam (35%): It will be taken online via OWL on March 1 during class.
- Poster Presentation (25%): Last day of class during class.
- Empirical Research Paper (40%): Due April 22 at 4pm, submitted through the course website under Assignments.

A Note About Attendance: Because you cannot actively engage with the materials and your colleagues if you are not here, in order to receive a passing grade, students are expected to attend at least 80% of the class meetings for this course. This requirement will only be waived in exceptional circumstances with documentation. While attendance is not an explicit part of the evaluation breakdown, you will see your final grade lowered if you miss an excessive number of class sessions. Please inform me as soon as possible if you are unable to attend a class for medical or personal reasons.

How to Contact Me

If you have questions about the course content or logistics of the course that could be useful to the rest of the class, please post them to the Forum on OWL. If you have specific questions for me, I can be reached via email at Rachel.margolis@uwo.ca. Students are encouraged to sign up for office hours which are Fridays 12pm-1:30pm. You can sign up for a 15-minute slot via the Signup Tool on the course website.

How to Get Important information

You will find course content and announcements posted to our OWL website. I will also announce any upcoming deadlines or changes to the course schedule in class.

Important Policies

Assignment Deadlines. Students must submit their assignments by the date and time stated in the course outline and on the OWL website. Late assignments will be penalized 10% for each day they are late. Any assignment not received within 5 days of the due date will not be accepted, except in the event of a documented medical or family emergency. If a student anticipates an issue with an assignment, they are recommended to speak to the professor as early as possible to make alternative arrangements.

Plagiarism. Students must write their assignments in their own words. Whenever students take an idea from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major scholastic offence (the Scholastic Offence Policy can be viewed in the Western Academic Calendar). All required assignments may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (www.turnitin.com).

Standards of Professional Behaviour: It is the responsibility of all members of the Department of Sociology to adhere to and promote standards of professional behaviour that support an effective learning environment. These include:

- Respect for others both in and out of the classroom through words and actions (be professional, fair, and respectful in interactions with people on-line and in-person; understand and respect differences among classmates and colleagues; avoid disrupting the learning environment; respect others' expectations of confidentiality and privacy).
- Active engagement in learning and commitment to quality (being prepared for classes; participating and listening actively to other; using technology and social media appropriately, striving to do your best). Take responsibility for your own learning by: relating course content and projects to your own professional interests; monitoring your own understanding; seeking clarification and assistance when necessary.
- Personal integrity (following through on commitments; doing one's own work).

Students should also be aware of the UWO Student Code of Conduct found at: <https://www.uwo.ca/univsec/pdf/board/code.pdf>.

Copyright of Lectures and Other Course Materials. Any materials created by the instructor (e.g., notes, handouts, summaries, slide, assignments, exams, etc.) are protected by copyright law and may not be copied or distributed in any form without the explicit permission of the instructor. Any non-authorized use of these materials constitutes an academic offence.

Scholastic Offences. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence (www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Accommodation. Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program. Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are encouraged to register with Student Accessibility Services, a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both SAS and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction. For more information, see <http://www.sdc.uwo.ca/ssd/>.

Completion of Course Requirements. Course requirements must be completed by the end of the term in which the course is offered (Fall–December 31; Winter–April 30, Summer–August 31). Only in exceptional circumstances may a student take additional time to complete the course requirements. In such a case, the student must first meet with the Graduate Chair to request permission to carry the incomplete. Medical documentation, where required, will be kept on file in the Sociology graduate program office. More details regarding incompletes are outlined in the Graduate Handbook: http://www.sociology.uwo.ca/graduate_handbook/course_information.html.

Accessibility Options. Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111, x82147 for any specific question regarding an accommodation. Information regarding accommodation of exams is available on the Registrar's website:
www.registrar.uwo.ca/examinations/accommodated_exams.html.

Mental Health. Students in emotional/mental distress should refer to Mental Health@Western (http://uwo.ca/health/mental_wellbeing/index.html) for a complete list of options how to obtain help.

Health and Wellness. As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. The Wellness Education Centre (lower level UCC) assists students in finding mental health and other related resources best suited to their needs (<http://se.uwo.ca/wec.html>). Western's School of Graduate and Postdoctoral Studies' LivingWell website provides tips for thriving at grad school and other helpful information (http://grad.uwo.ca/current_students/living_well/index.html).

Western provides several on-campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. Also, we encourage you to check out the Faculty of Music web page (<http://www.music.uwo.ca/>), and our own McIntosh Gallery (<http://www.mcintoshgallery.ca/>).

Disputing a Grade. Students who wish to dispute an assignment, exam, or course grade must write a one-page explanation justifying why their work should be re-evaluated. Work will not be re-evaluated on the basis that students were sick or feeling stressed when completing the assignment. Please be advised that a student's mark may go up or down upon re-evaluation.

Extraordinary Circumstances. The content and/or evaluation of this course is subject to change in the event of extraordinary circumstances beyond the University's or instructor's control.

Course Schedule

January 11: Introduction

- Empirical reading: Burgard and Ailshire. 2013. Gender and Time for Sleep among U.S. Adults. *American Sociological Review* 78:51.

January 18: Linear Regression (1)

- Methods readings: Choose one of the following three.
 - Gordon textbook Chapters 5 (Basics Concepts of Bivariate Regression), Chapter 6 (Basic Concepts of Multiple Regression, Chapter 7 (Dummy Variables).
 - Allison, Paul. Multiple Regression: A Primer.
 - Agresti and Finlay (4th ed) Chapters 9 (Linear regression and correlation, Chapter 10 (Multivariate relationships) and Chapter 11 (Multiple regression and correlation).
- Empirical reading: Feliciano, Cynthia and Yader Lanuza. 2017. An Immigrant Paradox? Contextual Attainment and Intergenerational Educational Mobility. *American Sociological Review* 82(1): 211-241.

January 25: Linear Regression (2)

- Methods readings: Choose one of the following two.
 - Gordon textbook Chapters 8 (Interactions), Chapter 10 (Indirect effects and Omitted Variable Bias), and Chapter 11 (Outliers, Heteroskedasticity, and Multicollinearity).
 - Agresti and Finlay (4th ed) Chapter 14 (Model building with Multiple Regression)
- Empirical reading: Schieman, Schafer and McIvor. 2013. The Rewards of Authority in the Workplace: Do Gender and Age Matter? *Sociological Perspectives*.
- Lab #1 this week

February 1: Logistic Regression (1)

- Methods readings for this week and next week: Choose one of the following two.
 - Pampel, Fred C. 2000. Logistic Regression: A Primer. Thousand Oaks, California. Sage Publications.
 - Agresti and Finlay (4th ed): Chapter 15: Logistic Regression.
- Empirical reading: Peng, Lee and Ingersoll. 2002. An Introduction to Logistic Regression Analysis and Reporting. *The Journal of Educational Research*. 96(1): 1-14.

February 8: Logistic Regression (2)

- Empirical reading: Carr, Deborah. 2003. A “Good Death” for Whom? Quality of Spouse’s Death and Psychological Distress among Older Widowed Persons. *Journal of Health and Social Behavior* 44(2):215-232.
- Methods reading: See readings from February 1.
- Lab #2 this week

February 15: No class – Reading Week

February 22: Multinomial and ordered logistic regression

- Methods reading: Long. Regression Models for Categorical and Limited Dependent Variables. Chapters 5 and 6
- Empirical reading: Manning et al. 2000. The Relationship Context of Contraceptive Use at First Intercourse. *Family Planning Perspectives* 32(3):104-110.

March 1: Midterm exam

March 8: Event History Analysis (1)

- Methods reading: Clark et al. 2003. Survival Analysis Part I: Basic Concepts and First Analysis. *British Journal of Cancer* 89:232-238.
- Empirical reading: Yoshikawa et al. 2007. Violent Recidivism among Mentally Disordered Offenders in Japan. *Criminal Behavior and Mental Health* 17:137-151.

March 15: Event History Analysis (2)

- Methods reading: Bradburn et al. 2003. Survival Analysis Part II: Multivariate Data Analysis- An Introduction to Concepts and Methods. *British Journal of Cancer* 89:431-436.
- Empirical reading: Ampaw, F. D., and Jaeger, A. J. (2012). "Completing the Three Stages of Doctoral Education: An Event History Analysis." *Research in Higher Education* 53(6): 640-660.
- Lab #3 this week

March 22: Instrumental Variables

- Methods reading: Moffitt, Robert A. Issues in the Estimation of Causal Effects in Population Research, with an Application to the Effects of Teenage Childbearing. *Chapter 2 in Causal Analysis in Population Studies*. Springer.
- Empirical reading: Leventhal and Brooks-Gunn. 2003. Moving to Opportunity: An Experimental Study of Neighborhood Effects on Mental Health. *American Journal of Public Health*. 93(9):1576-1582.

March 29: Fixed Effects

- Methods reading: Allison, Paul D. Fixed Effects Regression Models. SAGE little Green book Chapter 1.
- Empirical reading: Geronimus and Korenman. 1992. The Socioeconomic Consequences of Teen Childbearing Reconsidered. *The Quarterly Journal of Economics* 107(4):1187-1214.

April 5 or 12 TBA: Poster Session

April 22: Empirical research paper due at 4pm. Submit via Owl (under Assignments)