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The University of Western Ontario
SOCIOLOGY 9001A
Introduction to Multivariate Statistics
Fall 2022
Thursdays 2:30pm-5:30pm SSC: 1316A

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Office Hours: Wednesdays 11am – 1pm or by appointment

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Enrollment Restrictions

Enrollment in this course is restricted to graduate students in Sociology program, as well as any student that has obtained special permission to enroll in this course from the course instructor as well as the Graduate Chair (or equivalent) from the student's home program.

Course Description

The course will provide an introduction to the statistical concepts and techniques used in social science research. The course will introduce foundational statistical operations, including descriptive statistics, sampling distributions, statistical inference, correlation, and linear regression, and examine how these operations are applied in empirical research. Throughout the course, students will learn how quantitative data are collected, processed, and analyzed to answer empirical questions. The lab sessions, using STATA – a commonly used statistical software, will also provide basic skillsets for data management and data handling prior to analysis, as well as basic statistical tools for data analysis. A set of lab assignments and an exam will solidify the foundational knowledge and operational skillsets for producing relevant statistical results, while the independent course project help students apply them to answer empirical research questions. This course is intended to prepare students to take Advanced Multivariate Statistical Analysis (Sociology 9007) in the winter term.

Learning Outcomes

- Learn how data are collected and used in quantitative social science
- Understand common statistical tools and become able to appropriately apply them and interpret the results to answer empirical research questions
- Gain operational skillsets to manage and process survey data with the statistical software package Stata
- Thoughtfully evaluate methodology in the published sociological research using the quantitative methods

Prerequisite(s):

Students should have taken an introductory statistics course during their undergraduate education: Sociology 2205A/B and 2206A/B or the former 231 (or equivalent) and enrollment in fourth year of an Honors Specialization or Honors Double Major in Social Science. 60% in Sociology 2205A/B and 2206A/B or the former 231. If not in an Honors Specialization, a minimum grade of 70% in Sociology 2205A/B and 2206A/B or the former 231 or written permission from Department.

Course Material(s)

Required Text:

General Textbook on statistics:

Agresti, Alan (2018). *Statistical Methods for the Social Sciences*, Fifth Edition. Pearson. (Ebook version is also available)

Empirical Readings: Throughout the course, we will explore a set of journal articles that apply the statistical operations covered in this course. They also use Canadian national survey data. During the lab, we will use the Public Use Microdata Files (PUMFs) of these survey data and review how the researchers use the data, produce statistical results, and interpret them to answer research questions. These readings also offer useful insights to develop research questions for the course project assignment. They are available on the OWL course reading.

In addition to the required texts, there are optional texts to provide alternative explanations and additional examples or problems.

General:

- Moore, David, S., W.I. Notz, and M. Fligner. 2021. *The Basic Practice of Statistics* (9th edition)
- Noack, Andrea. 2018. *Social Statistics in Action: A Canadian Introduction*. Oxford.

Using Stata:

- Longest, Kyle C. 2019. *Using Stata for Quantitative Data Analysis*, Third Edition. Sage.
- Long, J. Scott. 2009. *The Workflow of Data Analysis Using Stata*. Stata Press.

Statistical Software of Instruction: STATA will be used throughout the course.

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 student of this course. You can also access to Stata in one of the Social Science Computing labs through a shortcut on the MyVLab Desktop. For questions about the service, please call either the SSNDS main office (519-661-2152) or the ITS Help Desk (519-661-3800).

No prior knowledge on STATA is required and the lab sessions in this course will cover the basic data handling process. However, students may find it useful to explore the UCLA's Stata website to learn more of the STATA operation (<https://stats.idre.ucla.edu/stata/>).

Methods of Evaluation

There are three main components of assignments:

1. Lab Exercise (5*2%=10%):

To solidify the statistical operations, *five sets* of exercises will be offered throughout the term. It will ask students to apply statistical procedure to produce statistical results and interpret them. Students are *allowed to work in a group up to four members*. The set of the question will be introduced during the labs and due on the night before the following week's class (Wednesday night at 11:55pm).

2. Mid-term exam (30%): Take-home exam

The questions will be posted on the OWL after the class on October 27th and the submission should be made on the OWL due on **Wednesday, November 9th** at 11:55pm.

3. Course Project (CP) Assignment 50%:

To apply the statistical concepts and tools in the real-life research context, students will develop an original course project and write an empirical paper. The assignment consists of three segments, each of which will build on the previous assignments.

- CP 1: Topic statement, review of literature, research question, hypothesis 10% (max. 5 pages)
Due on Friday, September 30th
- CP2: Data, Measures, Descriptive Statistics 15% (max. 10 pages)
Due on Friday, November 18th
- CP3: Final paper 25% (max. 15 Pages)
Due on Friday, December 16th

Course Schedule (Note: This schedule is subject to change over the course of the term: and additional empirical readings will be announced throughout the course)

Week 1 (Sept. 15): Introduction

- Read Agresti Ch. 1
- Stata Lab: The basics

Week 2 (Sept. 22): Sampling and Measurement

- Read Agresti Ch. 2
- Stata Lab: Preparing data for analysis

Week 3 (Sept. 29): Descriptive Statistics

- Read Agresti Ch. 3
- Stata Lab: Describing data

Week 4 (Oct. 6): Probability Distributions

- Read Agresti Ch. 4
- Stata Lab: TBA

Week 5 (Oct. 13): Statistical Inference: Estimation

- Read Agresti Ch. 5
- Stata Lab: Graphs

Week 6 (Oct. 20): Statistical Inference: Significance Tests

- Read Agresti Ch. 6
- Stata Lab: Inferential statistics with STATA

Week 7 (Oct. 27): Comparison of Two Groups

- Read Agresti Ch. 7
- Stata Lab 4: Testing between groups

***** Nov. 3: Reading Week – no class*****

Week 8 (Nov. 10): Analyzing Association b/w Categorical Variables

- Read Agresti Ch. 8
- Stata Lab: Chi-square tests

Week 9 (Nov. 17): Linear Regression and Correlation

- Read Agresti Ch. 9
- Stata Lab: Regression and correlation

Week 10 (Nov. 24): Introduction to Multivariate Relationships

- Read Agresti Ch. 10
- Stata Lab: Correlation and regression

Week 11 (Dec. 1): Multiple Regression and Correlation

- Read Agresti Ch. 11 & 12
- Stata Lab: Multiple regression

Week 12 (Dec. 8): Regression Diagnostics and Model Building

- Read Agresti Ch. 13 & 14
- Stata Lab: Multiple regression

*******Final paper due: Friday, December 16, at 11:55pm*******

Important Policies

Policies for Assignment Deadlines

Students must submit the assignments by the deadlines specified in the course outline. In the case of medical or family emergency, which prevents assignment submission on time, please contact the instructor at the earliest convenience. Without a contact with the instructor, late submission will be subject to a penalty of 5% for each day of delay and any assignments not received within 5 days of the due date will not be accepted.

Statement on Academic Offences

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the 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 (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

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

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)
- **personal integrity** (following through on commitments; doing own work)

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

Accessible Education Western (AEW)

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 strongly encouraged to register with Accessible Education Western (AEW), a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both AEW 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.

Health/Wellness Services

Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.