MRPE 9300B · Statistics

Winter Term 2021
The University of Western Ontario

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Class Meetings:
Held virtually and
asynchronously via OWL

Office Hours:
Tuesdays, 2:00-5:00pm, schedule here:
https://calendly.com/patrickdenice/15min

Although this academic year might be different, Western University is committed to a thriving campus. We encourage you to check out the Digital Student Experience website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: https://www.uwo.ca/health/.

Course Description

Overview. This course is designed to equip students with the tools necessary to analyze policy- and practice-related questions either on their own or as a member of a team, to critically consume statistical information, and to communicate their findings in effective and appropriate ways. We focus on the fundamental building blocks of statistical analysis in order to address practical problems in policy and practice. We will start with simple statistical concepts for describing and summarizing data, and build towards more sophisticated tools for making decisions and predictions about the social world. Topics covered include: measures of central tendency and variation, probability, hypothesis testing, correlation, and regression. Students will also use the statistical software program Stata to develop their data analysis skills. By the end of the course, students will be able to conduct their own descriptive analyses of real data, as well as read and interpret statistical analyses conducted by others.

Throughout the course, we will encounter some math and mathematical concepts, but no particular math skills beyond algebra are required. I will introduce notation, concepts, and methodology gently and with an eye towards practical application. The course, however, is *not* focused on mathematical statistics.

Learning Outcomes

1. Learn how data are collected and used in quantitative social science and policy analysis

2. Understand common statistical tools, when and how to appropriately use them, their underlying assumptions, and how to interpret their results
3. Read and thoughtfully evaluate published social science and policy-relevant research using the quantitative methods we cover
4. Gain basic familiarity with the statistical software package Stata in order to manage survey data, describe patterns, and interpret relationships between variables

Course Materials

Readings. We will rely primarily on the following textbook:

Agresti, Alan (2018). *Statistical Methods for the Social Sciences*, Fifth Edition. Pearson.

The textbook is also available for purchase as an e-book at this link: `https://www.vitalsource.com/referral?term=9780134512822`. You are more than welcome to use an earlier edition (e.g., the 4th edition), and to obtain the book in whatever way is most convenient and economical for you.

In addition, I recommend the following *optional* texts if you are looking for other explanations, examples, or problems:

General:

- Arnold, Robert (2014). *Intermediate Social Statistics*. Oxford.

- Noack, Andrea M. (2018). *Social Statistics in Action: A Canadian Introduction*. Oxford.

- Treiman, Donald J. (2009). *Quantitative Data Analysis: Doing Social Research to Test Ideas*. Jossey-Bass.

- Gordon, Rachel A. (2010). *Regression Analysis for the Social Sciences*. Routledge Press.

Using Stata:

- Kohler, Ulrich, and Frauke Kreuter (2012). *Data Analysis Using Stata*, Third Edition. Stata Press.

- 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.

- Rabe-Hesketh, Sophia, and Brian Everitt (2007). *Handbook of Statistical Analysis Using Stata*, Fourth Edition. Chapman and Hall.

Writing about Statistics:

- Miller, Jane E. (2005). *The Chicago Guide to Writing about Multivariate Statistics*. University of Chicago Press.

Stata. Throughout the course, we will practice using the statistical package Stata. I'm not expecting you to have any prior experience with or knowledge of this particular program, but it would be helpful to have had some exposure to other statistical tools (e.g., SPSS, R, or even Excel). Students—particularly those with limited computer literacy—may find it useful to explore the opportunities provided by the Social Science Computing Lab as they get up to speed with Stata.

Another great resource is UCLA's Stata website (`https://stats.idre.ucla.edu/stata/`).

While you are welcome to purchase your own copy of Stata, you should not need to. 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 do not, please let me know.

If we are allowed back on campus during the term, and 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).

Course Evaluation

Weekly Activities on OWL (25%). Each week, I will post a module to our course site on OWL, which can be found by clicking the *Course Content* tab on the left-hand side of the homepage. These modules will consist of short videos, text explanations of the material, and examples. Embedded throughout each week's modules will be a set of questions and exercises designed to help you practice what we're learning. You will not be evaluated based on whether you get the right answers, only that you answered all of them. *If you complete all of the activities and answer all the questions, then you will obtain a full participation mark.*

Furthermore, because I understand that things come up over the course of a term, and because we are living through extraordinary circumstances, I will only *count 10 of the 12* weekly activity modules toward your course mark. In other words, each student is permitted to miss or skip 2 of the weekly modules. This is intended to serve as a *universal accommodation* available to all students, for any reason, and with no need for documentation. That said, once released, weekly modules will be available for the remainder of the term so that students who miss one can still access the material.

New modules will be released *each Wednesday at 9:00am*, beginning on January 13, 2021. Students will have one week to complete all of that week's material at their own pace. All activities and practice questions must be completed by the next Wednesday (at 11:55pm).

Problem Sets (75%). In statistics, as in life, practice makes habit. As such, there will be five (5) problem sets to provide you with the opportunity to practice what we learn—including what we do on Stata. Each problem set is worth 15% of your course mark. Problem sets will be made available through OWL's *Assignments* tool. They are posted at the beginning of the week they are listed in the course schedule below, and due at the end of that week. For example, Problem Set 1 is listed during Week 3. It will be released with the rest of the Week 3 material on Wednesday, Jan. 27, and it will be due the following Wednesday, Feb. 3 at 11:55pm. Students may work together, but each must turn in their own assignment.

How to Contact Me

If you have course-related questions that may be relevant to the whole class, I encourage you to post them to the Course Café on OWL's Forums. If you have a specific question for me, you may contact me through OWL Messages. If there is a problem with OWL, send me an email (pdenice@uwo.ca).

Students are also encouraged to meet with me individually or in small groups during my student drop-in hours. You can set up a 15-minute meeting during these hours through Calendly.[1]

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. If you miss a class, check with a classmate for any notes or other materials.

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 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`.

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[1] I'm starting the term offering 15-minute time slots. As needed, I will expand both my available office hours and the meeting durations.

Copyright of Lectures and Other Course Materials. Any materials created by the instructor (e.g., videos, notes, handouts, summaries, slide decks, 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 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' Living Well 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 Recre- ation 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

Please note: This schedule is subject to change over the course of the term in order to meet the needs of the class. Any changes will be announced through our OWL course website.

Week 1 (Jan. 13): Introduction

☐ Read Agresti Ch. 1

☐ Stata Lab 1: The basics

Week 2 (Jan. 20): Sampling and Measurement

☐ Read Agresti Ch. 2

Week 3 (Jan. 27): Descriptive Statistics

☐ Read Agresti Ch. 3

☐ Stata Lab 2: Describing data

☐ Problem Set 1

Week 4 (Feb. 3): Probability Distributions

☐ Read Agresti Ch. 4

Week 5 (Feb. 10): Statistical Inference: Estimation

    ☐ Read Agresti Ch. 5

    ☐ Stata Lab 3: Graphs

Feb. 17: *Reading Week – no class*

    • *Enjoy the break!*

Week 6 (Feb. 24): Statistical Inference: Significance Tests

    ☐ Read Agresti Ch. 6

    ☐ Problem Set 2

Week 7 (Mar. 3): Comparison of Two Groups

    ☐ Read Agresti Ch. 7

    ☐ Stata Lab 4: Testing between groups

Week 8 (Mar. 10): Analyzing Association between Categorical Variables

    ☐ Read Agresti Ch. 8

    ☐ Stata Lab 5: Chi-square tests

    ☐ Problem Set 3

Week 9 (Mar. 17): Correlation

    ☐ Begin reading Agresti Ch. 9–11

Week 10 (Mar. 24): Introduction to Linear Regression

    ☐ Continue reading Agresti Ch. 9–11

    ☐ Stata Lab 6: Correlation and regression

    ☐ Problem Set 4

Week 11 (Mar. 31): Multiple Linear Regression

    ☐ Continue reading Agresti Ch. 9–11

Week 12 (Apr. 7): Extensions and Threats to Linear Regression

☐ Continue reading Agresti Ch. 9–11

☐ Stata Lab 7: Multiple regression

☐ Problem Set 5