**SOC252H1F**
**FALL 2023**
**Intermediate Quantitative Methods in Sociology**
**University of Toronto**
**Class hours:** Tuesdays 13:10 – 15:00

**Instructor**: Sébastien Parker
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**Statement of Acknowledgement**
We acknowledge this sacred land on which the University of Toronto operates. It has been a site of human activity for 15,000 years. This land is the territory of the Huron Wendat and Petun First Nations, the Seneca, and most recently, the Mississaugas of the Credit River. The territory was the subject of the Dish With One Spoon Wampum Belt Covenant, an agreement between the Iroquois Confederacy and Confederacy of the Ojibwe and allied nations to peaceably share and care for the resources around the Great Lakes. Today, the meeting place of Toronto is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work in the community, on this territory. [*Council of Aboriginal Initiatives, 2014*]

## Course Description

As social scientists, we are interested in understanding how social outcomes vary across different groups, or how such outcomes are related to other characteristics and variables of interest. To answer such questions, we often need to collect data and analyze that data in a statistical way. The course introduces fundamental techniques and methods to analyze quantitative data to draw inferences about social processes. Specifically, the course covers data types, sampling and probability, exploratory data analysis, data visualization, and simple and multivariate linear regression. Issues of estimation, inference and method diagnostics will be discussed.

**Prerequisites**: The prerequisite to take this course is SOC202H1 (Introduction to Quantitative Methods in Sociology). Students without this requirement will be removed at any time discovered and without notice. In general, students are expected to have a solid background in univariate statistical analysis, including the basics of probability and statistical inference.

**Exclusions**: SOC300H1, ECO220Y1, PSY202H1, STA221H1

**Recommended Preparation**: SOC150H1

**Learning outcomes**

By the end of this course, you will be able to:

(1) Use professional tools for data analysis such as RStudio
(2) Summarize and visualize data
(3) Conduct exploratory data analysis
(4) Use and interpret regression models
(5) Critically evaluate statistical claims and modeling choices

**Evaluation Components**

| Type | Due Dates | Weight |
|---|---|---|
| Participation | Ongoing | 15% |
| Midterm | Oct. 17 | 25% |
| Stepping stone assignments | Oct. 3; Oct. 24; Nov. 21 | 35% |
| Final report | Dec. 12 | 25% |

**Grading Descriptions**

**Participation (15%)**

During the course, students will need to remain engage with the course content. After the initial introductory post on the discussion board, participation assignments will ask students to interpret and apply material we covered – ranging from statistical techniques, concepts, generating graphs, and making sense of output.

We encourage students to rely on peer working groups as they work on the assigned participation homework, but each student will submit their own work individually. In total, there will be six participation assignments (see Course Schedule), each worth 2.5%.

**Midterm (25%)**

The midterm test will be held during class time on October 17. It will cover all lectures and labs from in the first five sessions and will count for 25 percent of your final grade. You will have the full class period (110 minutes) to complete the test, which will consist of short-answer questions.

**Stepping stone project (35%)**

In total, there will be three stepping stone assignments helping you work towards the final report, which is intended as a professional & complete manuscript.

(1) The *first stepping stone* (10%) is a discussion of your research question, case, hypotheses, and data due on October 3.

(2) The *second stepping stone* (10%) involves exploratory data analysis, initial visualizations and inferences, due on October 24.

(3) The *third stepping stone* (15%) is a description of the methods of analysis, assumptions, and main results due on November 21.

**Final report (25%)**
The final write-up of the report should be structured as a journal article and include the following: (a) introduction; (b) literature and hypotheses; (c) description of data; (d) description of methods of analysis; (e) results; (f) discussion; (g) conclusion.

## Course Policies and Student Responsibilities

**Email Policy**
I will respond to your email within two business days (48 hours, except weekends and holidays). In an email exchanges, you must use your official University of Toronto email. Please also include the course code (e.g., SOC252) in the subject line.

In general, please treat emails as you would any other professional communication. You should be respectful in the way you address the instructor and the TA. Email is most suitable for questions that are clear, concise, and easily answerable. If you need help on course material, I strongly encourage you to attend office hours or make an appointment. For all general inquiries, please refer to the course syllabus.

**Help from your Teaching Assistant**
Your T.A. will hold scheduled office hours and respond to your emails. Please be judicious in your use of email. Use it only for questions that are brief and specific. Before sending a question by email, be sure to check the course outline to see if an answer is already available. Emails should not be seen as an alternative to doing the assigned reading or attending lectures. Expect to receive a response from your T.A. within two working days. For more in-depth discussions, take advantage of your T.A.'s office hours.

**Accessibility**
If you require accommodations or have any accessibility concerns, please visit http://studentlife.utoronto.ca/accessibility as soon as possible.

**Missed tests and assignments**
If a student misses the midterm test or submit assignments later for medical reasons, the student must contact me (not the TA) within 1 day of the missed exam or assignment and also declare their absence on ACORN. For other reasons, such as family emergencies or personal reasons, they must have the college registrar email me

**Grade Appeals**
The instructor and teaching assistants do their best to mark work fairly, consistently, and accurately. Nevertheless, one of us may unintentionally err in our marking duties. For basic mathematical errors, simply alert the TA of the error. In the case of more substantive appeals, you must wait at least 24 hours after receiving your mark. If you wish to appeal, please submit a thorough written explanation to your instructor of why you think your mark should be altered. If your appeal is deemed appropriate, the entirety of your assignment will be re-graded. Please note that upon re-grade your mark may go down, stay the same, or go up. You have 7 days after receiving a mark to appeal it.

**Academic Integrity**
Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

Familiarize yourself with the University of Toronto's Code of Behaviour on Academic Matters (http://www.governingcouncil.utoronto.ca/policies/behaveac.htm). It is the rule book for academic behaviour at the U of T, and you are expected to know the rules.

The University of Toronto treats cases of academic misconduct very seriously. All suspected cases of academic dishonesty will be investigated following the procedures outlined in the Code. The consequences for academic misconduct can be severe, including a failure in the course and a notation on your transcript. If you have any questions about what is or is not permitted in this course, please do not hesitate to contact me. If you have questions about appropriate research and citation methods, seek out additional information from me, or from other available campus resources like the U of T Writing Website. If you are experiencing personal challenges that are having an impact on your academic work, please speak to me or seek the advice of your college registrar.

**Generative Artificial Intelligence**
Students are encouraged to make use of technology, including generative artificial intelligence tools, to contribute to their understanding of course materials. Students may use artificial intelligence tools, including generative AI, in this course as learning aids or to help produce assignments. However, students are ultimately accountable for the work they submit.

If using generative artificial intelligence tools as they work through the term assignment in this course, students must document this in an appendix. The documentation should include what tool(s) were used, how they were used, and how the results from the AI were incorporated into the submitted work.

**Ouriginal**
Sometimes, students will be required to submit their assignments to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (https://uoft.me/pdt-faq).

For some of your assignments, we will be using the software Ouriginal. It uses text matching technology as a method to uphold the University's high academic integrity standards to detect any potential plagiarism. Ouriginal is integrated into Quercus. For the assignments set up to use Ouriginal, the software will review your paper when you upload it to Quercus. To learn more about Ouriginal's privacy policy please review its Privacy Policy.
Students not wishing their assignment to be submitted through Ouriginal will not be assessed unless a student instead provides, along with their work, sufficient secondary material (e.g.,

reading notes, outlines of the paper, rough drafts of the final draft, etc.) to establish that the paper they submit is truly their own.

**Academic Integrity Clause**
Copying, plagiarizing, falsifying medical certificates, or other forms of academic misconduct will not be tolerated. Any student caught engaging in such activities will be referred to the Dean's office for adjudication. Any student abetting or otherwise assisting in such misconduct will also be subject to academic penalties.

Students are expected to cite sources in all written work and presentations. See this link for tips for how to use sources well:
(http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize).

According to Section B.I.1.(e) of the Code of Behaviour on Academic Matters it is an offence "to submit, without the knowledge and approval of the instructor to whom it is submitted, any academic work for which credit has previously been obtained or is being sought in another course or program of study in the University or elsewhere."

By enrolling in this course, you agree to abide by the university's rules regarding academic conduct, as outlined in the Calendar. You are expected to be familiar with the Code of Behaviour on Academic Matters
(http://www.artsci.utoronto.ca/osai/The-rules/code/the-code-of-behaviour-onacademic-matters) and Code of Student Conduct
(http://www.viceprovoststudents.utoronto.ca/publicationsandpolicies/codeofstudentconduct.htm) which spell out your rights, your duties and provide all the details on grading regulations and academic offences at the University of Toronto.

**Equity and Diversity**
The University of Toronto is committed to equity and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect. As a course instructor, I will neither condone nor tolerate behaviour that undermines the dignity or self-esteem of any individual in this course and wish to be alerted to any attempt to create an intimidating or hostile environment. It is our collective responsibility to create a space that is inclusive and welcomes discussion. Discrimination, harassment and hate speech will not be tolerated.

Additional information and reports on Equity and Diversity at the University of Toronto is available at
http://equity.hrandequity.utoronto.ca.

## Schedule, Readings, and Tutorials

**Tutorials**
This course has weekly tutorials on Thursdays, with two different sections: one between 1-3 pm (TUT0101) and the other between 3-5 pm (TUT0201), both held in UY17198. The tutorials are designed to provide instruction in the application of methods covered in lecture using the

statistical software package R. Each will involve working through an applied analysis of data as part of your homework assignments with the guidance of a teaching assistant.

**Software**
All statistical computing for this course will be done using R (https://www.rproject.org/about.html).

R is a statistical programming language, and computations are executed from a set of typed commands. The best way to use R is through RStudio, an editor which allows you to better see your code, directory and output.

Both R and RStudio are free to download to your own personal computer
1. Download R here: https://cran.rstudio.com/
2. Download RStudio here (free version)
https://posit.co/download/rstudio-desktop/

**Required readings and texts**

All required resources are freely accessible:

**MD:** *Statistical Inference via Data Science: A ModernDive into R and the Tidyverse* by Chester Ismay and Albert Y. Kim (available here: https://moderndive.com/)

**TSWD:** *Telling Stories with Data* by Rohan Alexander (available here: https://tellingstorieswithdata.com/)

**ROS:** *Regression and Other Stories* by Andrew Gelman, Jennifer Hill and Aki Vehtari (available here: https://avehtari.github.io/ROS-Examples/#Contents)

**Other recommended resources**

*Quantitative Social Science: An Introduction in tidyverse* (see here: https://press.princeton.edu/books/hardcover/9780691222271/quantitative-social-science)

*R for Data Science* (see here: https://r4ds.hadley.nz/)

*Data Visualization* (see here: https://socviz.co/index.html#preface)

*All of Statistics* (see here: https://egrcc.github.io/docs/math/all-of-statistics.pdf)

*Introduction to Modern Statistics (Open Intro Statistics)* (see here: https://www.openintro.org/book/ims/)

## *Detailed schedule*

| Session & Date | Topic | Readings | Assessment |
|---|---|---|---|
| 1. September 12 | Intro to course & EDA | MD Ch 1<br>TSWD Ch 2<br>ROS Ch 2 | Participation 1 (2.5%) |
| 2. September 19 | EDA and visualizing I | MD Ch 2<br>TSWD Ch 9 | |
| 3. September 26 | EDA and visualizing II | MD Ch 3, Ch 4<br>TSWD Ch 11 | Participation 2 (2.5%) |
| 4. October 3 | FI I: Modelling, distributions, and probability | ROS Ch 3, Ch 4 | SSP1 (10%) |
| 5. October 10 | FI II: Hypothesis testing, likelihood and uncertainty | MD Ch 8, Ch 9 | Participation 3 (2.5%) |
| 6. October 17 | Midterm exam | | Midterm (25%) |
| 7. October 24 | Linear regression | ROS Ch 7, Ch 8<br>TSWD Ch 12 | SSP2 (10%) |
| 8. October 31 | Multiple linear regression and interactions | ROS Ch 10, Ch 11 | Participation 4 (2.5%) |
| **READING WEEK** | | | |
| 9. November 14 | Logistic regression | ROS Ch 13, Ch 14 | Participation 5 (2.5%) |
| 10. November 21 | Generalized linear models | ROS Ch 15<br>TSWD Ch 13 | SSP3 (15%) |
| 11. November 28 | Causal inference | ROS Ch 20<br>TSWD Ch 14 | Participation 6 (2.5%) |
| 12. December 5 | Wrapping up, summarizing, & support | TSWD Ch 4 | |
| *December 12* | | | Final report (25%) |