

SOCI 621. Fixed and Random Effects
Department of Sociology, McGill University
Winter 2017

General Information

Pre-requisite

Successful completion of SOCI504 (<https://www.mcgill.ca/sociology/files/sociology/syllabus2015.pdf>) or equivalent (other graduate-level multiple regression courses may fulfill this prerequisite with instructor's approval.) The course also requires skills that would be covered in a basic college algebra course.

Course number and title, number of credits

SOCI 621. Fixed and random effects, 3 credits

Meeting times and location

Lectures: Mon and Wed 13:05-14:25, Peterson Hall 310;

Instructor

Amélie Quesnel-Vallée, Canada Research Chair in Policies and Health Inequalities, Professor in the Department of Sociology and the Department of Epidemiology, Biostatistics and Occupational Health.
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Office: Peterson Hall, 3460 McTavish, room 344

Office hours: After class on Mondays and Wednesdays, please make an appointment with me at www.needtomeet.com/amelieqv. You will see that the time after class appears to be blocked with a previous appointment, it's just to keep other people out of my schedule to leave the time for you!

Communication policy

I will make every attempt to answer emails in a timely fashion within 36 hours of receipt.

"As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Students with Disabilities, 514-398-6009."

"In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change."

Course content

This course introduces extensions to basic regression. Using Stata, it covers various topics in the use of regression-based techniques for analyzing social science data, in particular models where the dependent variable cannot be assumed to be normally distributed, and fixed and random effect regression techniques with an emphasis on longitudinal panel and hierarchical data. Issues of causal inference and selection bias will be discussed as well.

The emphasis of the course will – to the extent possible – be on data analytic issues rather than on statistical theory. Statistical theory will be introduced to the extent necessary to ensure adequate understanding of the particular estimation technique.

Learning outcomes

This course will enable participants to:

- 1) understand the strengths and limitations of various statistical applications;
- 2) make sound decisions about which methods best fit the question and data;
- 3) understand and read critically quantitative social science research published in contemporary journals
- 4) conduct publishable research using these methods.

Required reading and software

John Fox. 2016. *Applied Regression and Generalized Linear Models*, 3rd Edition. Sage.

As I am assuming that you already acquired this book for SOCI504, I did not have the bookstore put in another order. Discuss with me prior to buying the textbook if you do not have it, you may borrow mine to make copies, as we will only be using a couple of chapters.

Other readings will be available electronically or in MyCourses, and assigned the week prior to class.

We will use **Stata** in this class, so you should have access to it on the laptop that you bring to class. If you do not have a laptop and/or do not have access to Stata, please let me know we will discuss your options in the first class.

Topics covered

This list provides a broad overview of the general content of the course that we will cover. Additional topics will be covered by the students' presentations.

Issues of causal inference.

Review of models for binary outcomes.

Estimating Logit and Probit analyses

Identification issues

Interpretation of coefficients

Hypothesis Testing, Goodness of Fit and Prediction

Data management of multilevel data using Stata.

Reshape function to move from wide to long files (and vice-versa)

Creation of time varying variables

Use of egen to create summary variables of time-varying effects

Introduction to macros and loops.

Regression models for multilevel data

Fixed Effects Models

Random Effects Models.

Hausman specification tests as applied to the specific task of testing the random effects assumption.

Key dates

- January 4: First course
- January 23 (or before): Select paper and textbook chapter with method to present
- February 27-March 1: Reading week, no class
- March 6-8: Classes cancelled – Use the time judiciously to prep your presentations!
- Two weeks prior to your presentation: Meet with me to go over your exercise and draft presentation

- March 13 – April 5: Student presentations (depending on the class size, we may only meet every other class during that period)
- April 10: Last class. Debrief (what did we learn, what worked, what didn't?) and celebration!

Evaluation

There are 3 components to the evaluation: Participation, five assignments and a methods presentation.

1. Participation (10%).

You will learn the most by actively engaging with the material. That means coming prepared, having read the material, done the assignment and asking and answering questions. There are no dumb questions in this class. If you have a question, chances are, someone else does as well, and you will do them a favor by asking it. We are all here to learn (yes, even me, see point 3 below!), and I hope to make this seminar an environment where you will feel safe asking questions.

2. Assignments (60%).

Five assignments will be due prior to reading week, roughly one per week between January 23 and February 27. The purpose of these assignments is to help you understand statistical concepts and mechanics through learning by doing.

The assignments include a computer-based analysis, your interpretation of the results, Stata syntax and Stata output. Each assignment is worth 12 points, and together they account for 60 percent of your course grade. The assignments are due in class the day of the due date. The specific topic of assignments will be provided at the first class.

Late assignments will be penalized 1 point per 24 hours they are late (see grading rubric), unless you have written beforehand with a valid excuse for the delay and a specific plan for when it will be submitted. You may discuss among yourselves and consult reference books, but may not submit the same material or minute variations of the same work.

Assignment topics, content and due dates

1. Logit analysis with X and Y in same survey year. Due Jan. 23.
2. Panel data management and preparation. Due Jan 30.
3. Logit with X and Y in different survey years. Due Feb 6
4. Fixed and random effects (with Hausman specification test). Due Feb 20.
5. Multilevel model. Due Feb. 27.

The assignments should cover the following points:

- A clear and concise statement of the research question you will be addressing
- A brief discussion of what and why the appropriate statistical model for the research question is
- A brief description of the variables and their coding, along with a discussion of possible missing data biases, weights, etc. if applicable.
- Formatted tables in the main text, along with your stata output included as an appendix
- An interpretation of the results, including the implication for the research question.

Assignment grading rubric

12 pts – no errors or, at most, very minor mistakes in math or in wording; great job

11 pts – no errors but did not fully address what one of the questions was asking; or a single error in terms of interpretation or model/test execution; a good job overall

10 pts – two major errors in execution or interpretation, or incomplete answers; shows a good level of effort but inadequate attention to or knowledge of some details

9 pts – more than two major errors in execution or interpretation; suggests inadequate effort or serious confusion about the methods featured in the assignment

0 pts – if you copy another student's syntax or report, you will receive no credit

(1 pt deduction for late assignments per day they are late without prior authorization.)

3. Methods presentation (30%).

Because there is no better way to learn than by doing, you will develop a session of course content, providing a brief overview of another method not already covered in class. The content should be geared towards the practical application of the method, not on in-depth statistical theory. With my assistance, you will pick an article featuring a method that you wish to present, develop a brief lecture (30 minutes) as well as a Stata exercise to be performed in class, and provide the class with a one-page "cheat sheet" summarizing the main takeaway points of your presentation, focusing particularly on the conditions under which these methods are indicated (or not). You will be evaluated on these three components (presentation, exercise, one-pager).

The goal here is twofold:

1. You will explore a new method with an eye to application, and gain confidence in your statistical acumen by presenting it to peers and
2. In so doing, you will increase each other's exposure to a broader range of methods in which you can then delve deeper if the need arises.

These **presentations will occur in the course of the last four weeks of the class, from March 13 to April 5** (on April 10, we will debrief and celebrate!). I will attempt to maximize your preferences for a presentation date, but in the case of ties, I will do a random draw.

It is important to get started on this early! In order to help you prepare, I established the following timeline:

By January 23 at the latest: Email me the research article you identified that features the method of interest as well as a reference to a text that describes the method. The earlier you do this, the more likely you are to get your pick of the method!

Two weeks prior to your presentation: You will meet with me to go over your exercise, presentation and your cheat sheet. I will provide constructive feedback to help improve your deliverables to ensure an optimal experience for both teachers (you!) and students (also you, but not at the same time!).

Examples of methods that could be of interest (non-exhaustive list, these are just the ones that I am more generally familiar with): Imputation techniques for missing values; sample selection models (Heckman selection); propensity score models; marginal structural models; segmented regression; interrupted time series; difference-in-differences models; instrumental variables; regression discontinuity.

Students' rights and responsibilities

Attendance and participation in class discussions.

You are responsible for all announcements made in class and on MyCourses, as well as for all course materials given out in class. You should also check for new announcements, changes to the course outline or material on MyCourses at least weekly.

Remise des travaux en français

"Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue)." (approved by Senate on 21 January 2009)

Review of a mark

You have the right to ask for a regrading if you feel that your work was not accurately graded.

However, in order to request a regrade, **you must write a one page paper indicating the reasons why your work should be regraded** and hand it in to the professor **within a week of receiving the grade**.

In addition, during the regrading process, the work is analyzed much more critically. The first time around, we tend to give students the benefit of the doubt. **Please also note that will regrade the whole material (not just an individual question), and that we have the right to lower your grade in this process.**

You may prefer to meet with us and talk about how you may have improved your work and your learning.

Policy for the Accommodation of Religious Holy Days

"1 Students are not to be penalized if they cannot write examinations or be otherwise evaluated on their religious holy days where such activities conflict with their religious observances. (...)

2 Students who because of religious commitment cannot meet academic obligations, other than final examinations, on certain holy days are **responsible for informing their instructor, with two weeks' notice of each conflict.** (...)

3 When the requested accommodation concerns a **final examination, students are responsible for advising their faculty office as soon as possible and not later than the deadline for reporting conflicts.** Additional documentation confirming their religious affiliation may be requested."

(Approved by Senate - November 20, 1996 - Minute 92)

Statement on academic integrity at McGill

"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).(approved by Senate on 29 January 2003)

« *L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site www.mcgill.ca/students/srr/honest/).* »

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Guidelines for the use of mobile computing and communications

Allowed as long as not disruptive

Mobile computing and communications devices are permitted in class insofar as their use does not disrupt the teaching and learning process.