

Course Outline

Quantitative Methods for Development

McGill University

General Information

Course #	INTD 356
Term	Fall
Year	2021
Number of credits	3
Course schedule (day and time of class)	Monday and Wednesday 4:05 pm – 5:25 pm
Room	W215 – Arts Building

Instructor Information

Name and Title:	Fabien Forge, Ph.D. (he/him)
Email:	fabien.forge@mcgill.ca
Virtual office hours:	Mondays, 1pm – 3pm
Communication plan:	Online using Zoom during office hours, by email or by appointment Please consider emailing your TA first.

TA Information

Name:	Adam Aberra
Email:	adam.aberra@mail.mcgill.ca
Virtual office hours:	Thursdays, 9am – 10am

Course Overview

This course is designed to introduce students to impact evaluation. Can we improve vaccination in India with small nudges? Is pollution harmful in China? Does it matter to belong to the ethnic group of an elected official when it comes to employment? Does it really matter to have an extra year of schooling for income years later? If yes, what is the magnitude of these effects? How much should you trust these results? The answer to these questions determines public policy and inform debates about development issues.

Learning Outcomes

By the end of this course, students will be familiar with the main research designs used for impact evaluation. This includes the understanding of the statistical tools used, the ability to replicate research papers or perform their own analysis using R and interpret the results.

Instructional Method

Structure – The course is divided in 2 parts. Classes 1 through 10 are designed to introduce students to the fundamentals of statistics and causal inference. In the second part, we will study different research designs and learn about how they work and when one should use them.

Book – There is no required textbook for this course. Information provided during lectures and in the slides will be sufficient to write the exams. I will be providing students with several sets of practice questions during the course, and will not use exercises from any textbook.

For those students who would like to refer to a textbook during this course you have several possibilities:

- Stock, James H. and Mark W. Watson (2019). Introduction to Econometrics, 3rd or 4th edition, Pearson Education. – The content of the book is closest to what is taught in class
- Hanck, Christoph, Martin Arnold, Alexander Gerber, and Martin Schmelzer. "Introduction to Econometrics with R." University of Duisburg-Essen (2019). – is a free book available [online](#) which follows closely Stock and Watson (2015) and adds examples in R.

- Cunningham, Scott. "Causal Inference. The Mixtape 1", Yale University Press (2020) is also freely available [online](#) or you can buy the [book](#). While more advanced than what is required it also contains multiple examples in R.

Software – Many illustrations of mathematical concepts seen in class and regression analysis will use the [R language](#).¹ Students are encouraged to [install R](#) **then** [RStudio](#) as early as possible. Instructions can be found [here](#). Note that R and RStudio are free. You should **not** pay for any of this. Feel free to contact me if you have particular needs.

Expectations for Student Participation

Each class will be highly interactive, and students will be expected to participate in class discussions by making comments or asking questions.

Course Content

Date	Class	Description	Bibliography
01 Sep, Wed	1	Objective of the course	Watch Duflo (2010); Stock and Watson (2015) 1.1, 1.2, 4.1
06 Sep, Mon		Labour Day	
08 Sep, Wed	2	Intro to Probability and Statistics	Hanck et al. (2019) 2 and 3 , Cunningham (2021) 2.7 to 2.12
13 Sep, Mon	3	The OLS estimator	Stock and Watson (2015) 4.2, Appendix 4.2; Cunningham (2021) 2.13
15 Sep, Wed	4	Sampling distribution of the OLS estimator	Stock and Watson (2015) 4.4 and 4.5; Hanck et al. (2019) 4.5
20 Sep, Mon	5	Inference with the OLS estimator	Stock and Watson (2015) 5.1 and 5.2; Hanck et al. (2019) 5
22 Sep, Wed	6	Omitted variable bias	Stock and Watson (2015) 6.1; Hanck et al. (2019) 6.1
27 Sep, Mon	7	Multiple regression model	Stock and Watson (2015) 6.2 and 6.3; Hanck et al. (2019) chapter 6
29 Sep, Wed	8	Sampling distributions and inference in the multiple regression model	Stock and Watson (2015) 6.5, 6.6, 7.1, 7.2; Hanck et al. (2019) 7
04 Oct, Mon	9	Binary dependent variables	Stock and Watson (2015) 11.1, 11.2; Hanck et al. (2019) 11
06 Oct, Wed	10	Running regressions in R	Hanck et al. (2019) Chapters 4 to 7
11 Oct, Mon		Thanksgiving	
13 Oct, Wed		Reading Break	
14 Oct, Thu	11	Midterm 1	
18 Oct, Mon	12	Randomized Controlled Trials (RCT) – Theory	Stock and Watson (2015) 13.1; Hanck et al. (2019) 13.1 ; Cunningham (2021) 4
20 Oct, Wed	13	RCT – Application	Banerjee et al. (2010)
25 Oct, Mon	14	Panel Data Analysis – Theory	Stock and Watson (2015) 10.1–10.4; Hanck et al. (2019) 10.1–10.4 ; Cunningham (2021) 8.1 to 8.2.3

¹Students willing to submit their work in Stata or Python can do so provided they received my written agreement by email.

27 Oct, Wed	15	Panel Data Analysis – Application	Miguel (2005); Burgess et al. (2017)
01 Nov, Mon	16	Instrumental Variable (IV) – Theory	Stock and Watson (2015) 12.1; Hanck et al. (2019) 12.1 ; Cunningham (2021) 7
03 Nov, Wed	17	IV – Application	Heyes and Zhu (2019)
08 Nov, Mon	18	Difference-in-Difference (DiD) – Theory	Stock and Watson (2015) 13.4; Hanck et al. (2019) 13.4
10 Nov, Wed	19	DiD – Application	Duflo (2001)
15 Nov, Mon	20	Midterm 2	
17 Nov, Wed	21	Regression discontinuity design (RDD)– Theory	Stock and Watson (2015) 13.4; Hanck et al. (2019) 13.4 ; Cunningham (2021) 9
22 Nov, Mon	22	RDD – Application	Amodio et al. (2019) (link)
24 Nov, Wed	23	Matching and Synthetic Control Methods - Theory	Cunningham (2021) 9 ; Robbins and Davenport (2018) (link)
29 Nov, Mon	24	Matching and Synthetic Control Methods – Application	Becerril and Abdulai (2010)
01 Dec, Wed	25	Model specification and goodness of fit	Stock and Watson (2015) 4.3, 6.4 and 7.5; Hanck et al. (2019) 4.3
06 Dec, Mon	26	Internal and external validity	Banerjee et al. (2015)

Thursday, Oct 14 is the make-up lecture day for Monday classes and will follow a Monday schedule.

Evaluation

Assessment type	Date	% of final grade
Assignment 1 Statistics in R	October 04 Deadline: 11:59pm	10%
Midterm 1 Short questions testing students' understanding of classes 1 – 9	October 14 Class hour	15%
Assignment 2 Regressions in R	October 25 Deadline: 11:59pm	10%
Midterm 2 Short questions testing students' understanding of classes 1 – 19	November 15 Class hour	20%
Assignment 3 Replication of results using R	November 29 Deadline: 11:59pm	15%
Final exam – Take home Multiple choice questions on all classes	TBD 72 hours	30%

All assignments are an excuse to practice R and show your understanding of the concepts seen in class. Students are allowed to form groups of 3 (or less but not more) for these assignments. Assignments that are clear copy/paste of another group's assignment will receive 0.

Absence to midterms and/or the final exam:

If you miss **either** the first or second midterm, the weight of the missed exam will be placed on your final exam (which will thus be worth 45% if you missed midterm 1 or 50% if you missed midterm 2). No medical note is required. If you miss **both** midterms or the final exam, I will request a medical note within the delay set by the university and you will be able to write a make up exam. Either way, I strongly encourage you to reach out to me as soon as possible if you encounter any issue with respect to exam taking.

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

Optional course material

- Amodio, F., Chiovelli, G., and Hohmann, S. (2019). The employment effects of ethnic politics.
- Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thuysbaert, B., and Udry, C. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. *Science*, 348(6236).
- Banerjee, A. V., Duflo, E., Glennerster, R., and Kothari, D. (2010). Improving immunisation coverage in rural india: clustered randomised controlled evaluation of immunisation campaigns with and without incentives. *Bmj*, 340.
- Becerril, J. and Abdulai, A. (2010). The impact of improved maize varieties on poverty in mexico: A propensity score-matching approach. *World development*, 38(7):1024–1035.
- Burgess, R., Deschenes, O., Donaldson, D., and Greenstone, M. (2017). Weather, climate change and death in india. *University of Chicago*.
- Cunningham, S. (2021). *Causal Inference*. Yale University Press.
- Duflo, E. (2001). Schooling and labor market consequences of school construction in indonesia: Evidence from an unusual policy experiment. *American economic review*, 91(4):795–813.
- Duflo, E. (2010). Social experiments to fight poverty. *TED Talk*.
- Hanck, C., Arnold, M., Gerber, A., and Schmelzer, M. (2019). Introduction to Econometrics with R. *University of Duisburg-Essen*.
- Heyes, A. and Zhu, M. (2019). Air pollution as a cause of sleeplessness: Social media evidence from a panel of chinese cities. *Journal of Environmental Economics and Management*, 98:102247.
- Miguel, E. (2005). Poverty and witch killing. *The Review of Economic Studies*, 72(4):1153–1172.
- Robbins, M. and Davenport, S. (2018). Microsynth: A tutorial.
- Stock, J. H. and Watson, M. W. (2015). Introduction to econometrics 3rd ed.

McGill Policy Statements

Language of Submission

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives.

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).

Academic Integrity

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 McGill's [guide to academic honesty](#) for more information).

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 [guide pour l'honnêteté académique](#) de McGill).

Additional Statements

The [University Student Assessment Policy](#) exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations.

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.

McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather.

[End-of-course evaluations](#) are one of the ways that McGill works towards maintaining and improving the quality of courses and the student's learning experience. You will be notified by e-mail when the evaluations are available. Please note that a minimum number of responses must be received for results to be available to students."