

McGill University
ECON 257D1: Economic Statistics – Honours
Fall 2024

Instructor Contact Information

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Regular Classes

Tuesday and Thursday 1:05 pm to 2:25 pm
Room: ENGMC (McConnell Engineering Building), Room 11

Description

This is the outline for Term 1 of Honours Economic Statistics (ECON 257D1). Term 2 will be taught by Prof. Jean-Marie Dufour (ECON 257D2). The two terms together form the statistics pre-requisite for later Honours Economics courses. The objective is to provide a strong introductory understanding of applied statistical procedures used to perform statistical analysis in many business and economic situations.

A numerical grade will be computed for each term. The two grades from each term will be equally weighted to arrive at a final grade for the D course. No credit will be given for this course unless both ECON 257D1 and ECON 257D2 are completed in consecutive terms. Any letter grades assigned at intermediate stages are for information only; computations will be based on the underlying numerical quantities. Prof. Dufour and I will compute and review final grades at the end of the year, and do any rounding-off one time only, then.

Note: You may not be able to receive credit for this course and other statistics courses. Be sure to check the Course Overlap section under Faculty Degree Requirements in the Arts or Science section of the Calendar.

Evaluation

Your final grade for this course will be based on the following assessments. They aim to evaluate the following key learning aspects: understanding data preparation techniques; ability to identify relevant data features; understanding of fundamental statistical and probability concepts, as well as their theoretical applications.

10% - Assignments. There will be four assignments during the term. These will be made available on MyCourses a week prior to the deadline, which is normally on Sunday at midnight. See the tentative calendar below. Each assignment will involve several tasks, including data download and manipulation, data descriptive analysis, and theoretical statistical and probability exercises.

25% - Midterm Exam. On October 24 during lecture time, you will be tested on all the material covered up to that point. The midterm exam will involve multiple choice questions and open-ended questions. The latter will be of both conceptual nature and also involve theoretical statistical and probability exercises.

65% - Final Exam. You will be tested on all the material from the very beginning of classes. The exam will involve theoretical statistical and probability exercises.

If someone is unable to write the first midterm for a documented medical reason, the weight will be added to the December exam; if someone is unable to write the December exam, again for a documented medical reason, the weight will be added to the second-term final exam in April. The final (April) examination for the course, while emphasizing second-term material, may include some first-term material as this is a cumulative course.

In the event of extraordinary circumstances beyond the control of McGill University, assessment tasks in a course are subject to change, provided students are sent adequate and timely communications regarding the change.

Use of Artificial Intelligence (AI) Tools

You may choose to use generative artificial intelligence tools as you work through the assignments in this course; this use must be documented in an appendix for each assignment. 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. I reserve the right to ask you to explain your process for creating their assignment.

Deferred and Supplemental Examinations

In addition to what is stated in this syllabus, please familiarize yourself with the University rules on deferred and supplemental examinations. A deferred exam is one which replaces an exam that was missed; a supplemental exam is a second exam in a course which a student has failed and becomes a second (not replacement) grade for the course. There are University rules governing the circumstances in which you have the right to take one or the other of these exams.

There is no supplemental examination for the December exam, because it is not a final examination for the course. As noted above, the weight will be transferred to the April exam.

The deferred or supplemental examination for this course, which in accordance with University rules will be held in August following the end of the course, covers in principle the entire course. It may be a deferred exam for some students (those who missed the April exam) and a supplemental for others (those who did not pass the course and want to try again to pass and then receive the credits). A supplemental examination mark is not combined with other evaluation during the year, for those who take it; that is, the supplemental examination is 100% of the supplemental grade. However, if a student writes the August examination as a deferred exam because he or she missed the April exam, then it counts only for the weight of the exam that was missed.

A deferral requires a reason which is compatible with the University's policies, usually an illness. This requires documentation.

If you are booking travel for the December holidays, it is your responsibility to be sure that you will be here for the examinations. That means either waiting until the examination

schedule is available or booking travel for the day following the last day of examinations in December.

Transfers from Honours to Major Program

Transfers from ECON250 D1/D2 are permitted during the January add/drop period only. You can of course always do that before the end of the Fall add/drop period on September 10th. Outside of these windows, transfer to 227 is not possible. If you transfer into 227, the grade will be based entirely on work in that course. The interim grade from 257 will not be used. In the event that you decide to transfer, or are considering a transfer, be sure to speak with advisors in the Economics department. Lists of advisors for different programs are posted near the fourth-floor office in Leacock.

Textbooks and Course Material

I will post in pdf form, on MyCourses, Chapters 1-14 of a text titled “*Economic Statistics*” (ES) by Prof. John Galbraith which covers all of the material that we will address.

There is no strictly required textbook for the first term of this course, but you should nonetheless have something as reference, or share one with friends, to have a second source to read beyond ES. The default option would be to get a used copy of some edition of “*Statistics for Business and Economics*” (SBE) by Paul Newbold, William Carlson and Betty Thorne. Any edition is fine but note that references in the outline are for the 8th edition. I will not be assigning any exercises that refer to a particular book or edition. We are studying topics rather than sections from a particular book, and you can study these topics from any one of a number of good statistics texts. Used versions of some good texts can often be found at low prices, online or even in used book stores.

You may also decide to supplement the lecture notes and a standard textbook with material from the web or ChatGPT. Of course, you need to be very careful in doing this, because many of the things you will find online have errors that would typically have been caught in a published book (although of course published books have errors, they are generally fewer and less outrageous). The video or online materials that I have seen tend to be at a very introductory level, which may be of use in guiding your intuition, but would typically not be sufficiently precise to teach you to do the calculations that are necessary. So please don't rely on these things exclusively.

List of Topics by Date

This is a tentative list of topics to be covered. Chapters in SBE are from the 8th edition. Note that this is NOT an exhaustive list.

August 29: Introduction

September 3-5: Some Key Concepts

- ES, Chapter 1

Experimental vs. non-experimental data
Modelling, abstraction and learning from approximate models
Prediction vs. explanation
Correlation vs. causation

September 10-12: Economic and Financial Data

- ES, Chapter 2
- SBE, Chapter 1

Time series vs. cross-sectional data
Aggregate vs. individual data
Panel data
Transformations of data (difference, logarithms and their effects)
Categorical and numerical variables

September 17-19: Describing Data: Graphical

- ES, Chapter 2
- SBE, Chapter 1

Charts and Pareto diagrams
Frequency distributions
Histograms and Ogives
Shape of a distribution
Stem-and-Leaf displays
Scatter plots

September 24-26: Describing Data: Numerical

- ES, Chapter 3
- SBE, Chapter 2
- *Assignment 1*

Measures of central tendency (mean, median, and mode)
Measures of variability
Measures of relationship between variables

October 1-3: Learning From Data

- ES, Chapter 4

Corroboration
Falsification
Asymmetry
Deductive and inductive inference.

NOTE: No class on October 8

October 10 and 22: Probability

- ES, Chapter 5
- SBE, Chapter 3
- *Assignment 2*

Alternative concepts of probability

Concepts such as sample space, outcome, event

Axiomatic derivations of basic rules of probability

Unconditional and conditional probability

Bivariate probability

Dependence and independence

Bayes' Theorem

Tchebychev inequality

October 24: Midterm

October 29-31: Discrete Probability Distributions

- ES, Chapter 6-9
- SBE, Chapter 4

Random variables

Probability distributions for discrete random variables

Properties of discrete random variables

Expected value and variance of a discrete random variable

Binomial distribution

Poisson distribution

Jointly distributed discrete random variables

November 5-7: Continuous Probability Distributions

- ES, Chapter 6-9
- SBE, Chapter 5
- *Assignment 3*

Continuous random variables

Uniform distribution

Expectations for continuous random variables

Normal distribution

Exponential distribution

Jointly distributed continuous random variables

Linear combinations of random variables

November 12-14: Sampling

NOTE: Class via Zoom on November 14

- ES, Chapter 10-12

- SBE, Chapter 6
- *Assignment 4*

Sample versus population

Sampling distributions of sample moments in iid data

Law of large numbers and a simple central limit theorem (CLT)

November 19-21: Point Estimation

- ES, Chapter 13
- SBE, Chapter 7-8

Estimator

Bias

Loss functions including the mean squared error (MSE)

Decomposition of the MSE

November 26-28: Interval Estimation and Confidence Intervals

- ES, Chapter 14
- SBE, Chapter 7-8

Confidence intervals

Case of normally distributed data vs. more general case

December 3: Q&A Review Session

My E-mail Policy

Please minimize the use of the e-mail and speak to me in office hours instead. If you do write to me, please keep the e-mails short and simple.

Short e-mails to which I can answer 'yes' or 'no' will be answered more quickly. For questions on the content of the course, please come to my office hours. For administrative questions, please refer to this detailed syllabus.

My Laptop Policy

In general, I don't think it's a good idea to have laptops open in class. Much of the time, I know that people are doing something unrelated and it's distracting for other people in the class who are trying to participate. It's also not entirely compatible with a scholarly atmosphere; I would like people to be alert and able to ask questions in class if there's something that they don't follow.

However, I do realize that some people prefer to take notes on their laptops. If you are someone who wants to use your computer in class for taking notes, that is fine. In that case, come and speak to me and explain this, and I will trust that you will be doing nothing other than taking notes on your laptop. Unless you have come to clear this with me, please do not

open your computer in class. The same applies to tablets, smartphones, and other mobile devices as well.

Academic Policies

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.

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.

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

Copyright: All slides, video recordings, lecture notes, etc. remain the instructor's intellectual property. As such, you may use these only for your own learning (and research, with proper referencing/citation) ends. You are not permitted to disseminate or share these materials; doing so may violate the instructor's intellectual property rights and could be cause for disciplinary action.

Indigenous Land Statement: 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.

Disability: If you have a disability, please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 398-6009 before you do this.

Additional policies governing academic issues which affect students can be found in the McGill Charter of Students' Rights. Visit www.mcgill.ca/students/srr for more information.