

Economic Statistics

ECON 227 D1 – Sections 1 and 2

Mayssun El-Attar Vilalta

McGill University
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Course description and objectives

This course is the first part of a two-semester sequence. **Please note that you must register for both semesters to receive credit.**

The course is aimed at providing students with the statistical tools necessary for analyzing and interpreting economic data. The course introduces fundamental statistical concepts, including descriptive statistics, probability theory, and inferential statistics, with an emphasis on their application in economics. Throughout the semester, students will learn to describe and summarize data using numerical measures and graphical techniques. The course also covers probability rules, random variables, and probability distributions—both discrete and continuous—that are crucial for understanding economic outcomes. In the latter part of the course, students will delve into statistical inference, focusing on estimation, hypothesis testing, and comparing population parameters. Special attention will be given to experimental design and the analysis of categorical data. Students will also gain hands-on experience using the statistical software Stata to apply these methods to real-world datasets, preparing them for more advanced econometric analysis in subsequent courses.

By the end of the course, students should be able to:

- Apply descriptive and inferential statistical techniques to economic data.
- Use probability theory to model random events and understand the implications for decision-making.
- Conduct basic data analysis using Stata, including generating descriptive statistics, probability plots, confidence intervals, and hypothesis tests.

Administrative Issues

3 credits.

- Section 1: 3 lectures per week: Tuesday, Thursday and Friday, 12:35pm-1:25pm
- Section 2: 2 lectures per week: Tuesday and Thursday, 2:35pm-3:55pm

Restrictions:

- No credit is given for this course unless both ECON 227D1 is completed successfully in Fall 2024 and ECON 227D2 is completed successfully in Winter 2025.
- You may not be able to receive credit for both this course and other statistics courses. See an advisor if you have questions.

Contact:

course email: econ227fall2024@gmail.com

my email: mayssun.el-attarvilalta@mcgill.ca

office hours: Fri from 1:30pm to 2:30pm in Leacock 426.

For any matter related to the course, write to the course email.

Text and learning tools:

- The **textbook** for this course is the *Statistics for Business and Economics* (12th Edition) by McClave, Benson and Sincich, published by Pearson Education Canada.
- The text comes with access to an online site **MyLabEconomics**, at www.myeconlab.com, where you will find (i) explanations for a selection of end-of-chapter text exercises/questions, (ii) some short practice quizzes, (iii) datasets, and more. When using **MyEconLab** you will be asked for the course name ('Econ 227 – Fall 2024') and Course ID (el-attar13078).
- In addition to the textbook, there will be supplementary readings. I will also provide datasets, both from the textbook and external sources, for use in solving exercises and assignments. These resources will be made available on myCourses as needed.

Statistical Software: The course will require the use of the statistical program **Stata**. Stata is the statistical software used by most empirical economists. Knowledge of Stata is not a prerequisite for this course. I will post a separate document on how to use Stata at McGill on mycourses.

There are tons of online resources on data analysis with Stata, or Stata more generally. A web page with links to lots of useful resources for economists (going far beyond what you need in this course) is <https://www.stata.com/links/resources-for-learning-stata/>.

In addition, continuous class attendance is strongly encouraged. Any points raised in class can end up in the examinations.

TA support: TAs will hold weekly office hours. In these sessions, they will be available to answer your questions, help you to review the course material, and help you solve problems and exercises. Times and location will be posted on *mycourses*.

The TAs will answer questions by email: For any questions about the course, email econ227fall2024@gmail.com. The TAs and I will be answering questions sent to this email address.

Evaluation: Econ 227D1 is the first semester of a two semester course. You ultimately receive a single grade for the combination of the two semesters. Each semester contributes 50% to your final grade. There are no exceptions, except transfers from ECON257. The two semester grades will be averaged to arrive at the full-year grades.

For the fall semester, there will be two midterm exams, each will be worth 15% of the course grade, 4 assignments, each worth 5% of your course grade and a final exam worth 50% of your course grade.

The **midterm exams** will be **take home** exams, will take place at the specified date (see below) during class time. The exams will contain different type of questions: exercises related to the material covered in class, multiple choice questions and questions where you will work with data. You will need to make sure that you have a working copy of Stata installed on the laptop. There will be no lecture on the day of the exam. The midterm exam will follow the open-book format. That means that during the exam you will be allowed to consult resources as specified by the instructor. However, you are not allowed to communicate with other people about any aspect of the exam.

Anticipated dates for the exams:

- Midterm 1: Thursday October 10th (during class time)
- Midterm 2: Tuesday November 19th (during class time)

Make-up exams: The only acceptable reasons to miss an exam are documented family or medical emergencies. If you miss an exam, you must hand me an original physician's note within 7 days of the date of the exam which explains the medical reason for your absence. No make-up exams are possible for the midterm exam. If you miss the midterm exam, that exam's weight will be reallocated to the final exam.

There will be 4 **problem sets** in total. Official due dates will be announced on myCourses. Late submissions will not be accepted. Problem Sets count for 20% of the total grade (5% each).

The **final exam** will be held in person. It will be a 3-hour exam and will take place in December, at the date specified by McGill.

If you miss or are unable to write the final exam, you must request a **deferred exam** according to the process described here: www.mcgill.ca/exams/dates/supdefer. Please note that exam accommodations are rarely approved for reasons related to personal vacation, travel, or family events. The deferred exam will cover material from ECON 227D1 only.

Under no circumstances will you be allowed to present additional work to increase your grade in the course.

If you have any concerns regarding grading please get in touch with me. Mistakes in tallying scores would be corrected immediately. If you have other concerns about grading, please let me know. In such a case you must submit your entire exam for a regrade. Requests to regrade specific questions only will not be entertained.

Supplemental exam: There is no supplemental for the Fall semester. There will be a supplemental exam in August (worth 100% of the course grade). This exam will cover material of both semesters (D1 and D2).

MyCourses: You should regularly check the **myCourses** page for announcements, up-to-date information, additional readings, assignments, and other items to assist you in the course.

In case of absence at the final exam for medical reasons, please refer to the University Regulations Concerning Final Examinations. Note: According to Senate regulations, instructors are not permitted to make special arrangements for final exams. Please consult the Calendar, section 4.7.2.1, General University Information and Regulations at www.mcgill.ca. Also note: 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. Finally: In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

University statements

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 <http://www.mcgill.ca/students/srr/honest/> 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 site <http://www.mcgill.ca/students/srr/honest/>).

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.

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.

Under no circumstances will you be allowed to present additional work to increase your grade in the course.

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 Student Accessibility and Achievement (formerly Office for Students with Disabilities).

No audio or video recording of any kind is allowed in class without the explicit permission of the instructor. The use of Mobile Computing and Communications Devices devices must, in all cases, respect policies and regulations of the University, including in particular the Code of Student Conduct and Disciplinary Procedures; the Policy Concerning the Rights of Students with Disabilities; and the Policy on the Responsible Use of McGill IT Resources.

Instructor generated course materials (e.g., handouts, notes, summaries, exam questions, lecture and class recordings etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

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.

The reading list is subject to change during the semester. 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 Outline

Due to time constraints, it is possible that some topics will not be covered or some topics added. I maintain discretion regarding changes in this outline. Any changes will be announced in class and/or on *mycourses*.

Section 1: Statistical Thinking and Methods for Describing Data

Topics include:

- Fundamental elements of statistics (chapter 1).
- Types of data (chapter 1)
- Describing qualitative and quantitative data (chapter 2).
- Numerical measures of central tendency and variability (chapter 2)
- Graphing bivariate regressions (chapter 2)
- Distorting the truth with descriptive techniques (chapter 2)
- * Stata: Describing data and generating a random sample.

Section 2: Probability

Topics include:

- Events, sample spaces, and probability (chapter 3)
- The additive rule and mutually exclusive events (chapter 3)
- Conditional probability (chapter 3)
- The multiplicative rule and independent events (chapter 3)
- Bayes's Rule (chapter 3)
- * Stata: Discrete probabilities, continuous probabilities, normal probability plots and simulated sampling distributions.

Section 3: Probability Distributions

Topics include:

- Discrete random variables (chapter 4)
- Continuous random variables (chapter 4)
- Random variables based on sampling distributions (chapter 4)
- * Stata: Confidence intervals and working with large datasets.

Section 4: Inference

Topics include:

- Identifying and estimating the target parameter (chapter 5)
 - Confidence interval for a population mean (chapter 5)
 - Formulating hypotheses and setting up the rejection region (chapter 6)
 - Test of hypotheses about the population mean (chapter 6)
 - Comparing two population means (chapter 7)
 - Comparing two population variances (chapter 7)
- * Stata: Confidence intervals, tests of hypothesis and two-sample inferences

Section 5: Design of Experiments

Topics include:

- Elements of a designed experiment (chapter 8)
- The completely randomized design (chapter 8)
- The randomized block design (chapter 8)

Section 6: Categorical Data Analysis

Topics include:

- Categorical data and the multinomial experiment (chapter 9)
 - Testing category probabilities (chapter 9)
- * Stata: Discrimination in the Workplace (covers chapters 8 and 9)