

UNIVERSITY OF VICTORIA
DEPARTMENT OF ECONOMICS

ECONOMICS 545
ECONOMETRICS
(CRN11204)

FALL 2023

Instructor	Chris Auld auld@uvic.ca 250.721.8537 BEC 348
Office hours	Wednesdays 1:30-3:00, or drop-in, or by appointment.
Course page	Available on BrightSpace.
Course location	BEC 363
Course Meeting time	8:30–9:50am Mondays and Thursdays
Lab location	BEC 180
Lab meeting time	Wednesdays 9:30am
Prerequisites	Two undergraduate courses in econometrics, a course in linear algebra, and a course in calculus; or equivalent training in calculus, linear algebra, and probability theory. Please contact me if you think you are prepared for the course but lack these specific courses.

DESCRIPTION.

The course covers selected key concepts in modern econometrics, focusing on specification, estimation, and hypothesis testing within the linear model. The course is intended to serve as both a rigorous introduction to econometrics for students who will proceed to take further graduate econometrics courses or as a final course in econometrics for terminal M.A. students. While this is mainly a theoretical course, assignments will involve statistical computing, including analysis of real data.

MATERIALS.

The primary textbook for the course is

J. MacKinnon and R. Davidson (2021). [Foundations of Econometrics](#), manuscript, Queen's University.

This book is available for free as a .pdf online, as you will find if you click the link. *Foundations* is an incomplete, modest update of the same authors' 2004 textbook [Econometric Theory and Methods](#), which is also free online, although all the material we will cover in this course is contained in the newer version.

You will greatly benefit from reading discussions of the course material in other textbooks, some recommendations follow. Note that you may find relevant online lectures or lecture-like content on Youtube and similar platforms: these sources may be excellent, but they may also be nonsense and lead you astray, so if you exploit such content do so wisely and skeptically.

Recommended texts:

- Greene, William, *Econometric Analysis*, (2018) eighth edition.
Greene is an excellent reference pitched at roughly the same level of formality as the primary text.
- C. Cameron and P. Trivei (2022) *Microeconometrics Using Stata*.
Somewhere between an econometrics textbook and a Stata user's guide, this book is very useful for learning how to use Stata to implement the methods we will discuss.
- Cunningham, S. (2021) *Causal Analysis: The Mixtape*.
A relatively informal guide to identification strategies in modern microeconometrics. Hardcopies are available for purchase, also free online at <https://mixtape.scunning.com/>.
- Wooldridge, J. *Introductory Econometrics: A Modern Approach*
This is an undergraduate-level textbook which is insufficient for this course but serves well as a lower-level exposition of the material covered.
- Wooldridge, J. *Econometric Analysis of Cross-Section and Panel Data* (2008)
A text at a similar level and with similar scope to the required texts, entirely omits time-series and most related topics.

Slides and other current course material will be made available on Brightspace.

TENTATIVE SCHEDULE.

1. Introduction
2. Statistical foundations and the OLS estimator
 - quick review of distributions, densities, and probability
 - expectations and conditional expectations
 - matrix representation of the linear model
 - derivation of the OLS estimator in matrix form
 - geometry of least squares
 - theorem of Frisch, Waugh, and Lovell and applications
 - transformations of left and right-hand side variables
3. Statistical properties of the OLS estimator
 - causality versus prediction
 - bias
 - precision
 - heteroskedasticity
 - serial correlation and “clustering”
 - Generalized Least Squares
 - laws of large numbers and central limit theorems
 - consistency
 - irrelevant or omitted regressors
 - simultaneity
 - putting together our results: interpretation of OLS estimates
4. Hypothesis testing
 - power, size, and p-values
 - confidence intervals and regions
 - LM, LR, and Wald tests in the linear model
 - nonlinear restrictions
5. Instrumental variables
 - basic ideas and applied examples
 - the IV estimator and its statistical properties
 - testing for weak or invalid instruments
 - heterogeneous effects
6. Panel data
 - the structure of panel datasets
 - fixed and random effects
 - difference in difference estimation and inference

Additional readings may be assigned during the course, and topics may be added or deleted as the course progresses.

EXAMS AND ASSIGNMENTS.

There will be one midterm examination, which will be scheduled during the first week of the course.

There will be a cumulative final examination scheduled by the Registrar.

There will be regular assignments involving both theoretical work and computation, including simulation and analysis of real data.

The weights on these components are:

midterm exam	25%
final exam	45%
assignments	30%

Note that:

- A passing grade on the final exam must be obtained in order to pass the course.
- You must complete all course components to pass the course. If for some valid, as determined by University policy, reason you are unable to write the midterm exam, a deferred exam will be offered.
- Late assignments will be penalized. If you contact me ahead of time with a reason to hand an assignment in late, a late assignment may be accepted with or without penalty or with reduced penalty, depending on the context.
- You are encouraged to work on assignments collaboratively, but you must write up your own answers.
- Acceptable and unacceptable uses of AIs such as Chat-GPT will be discussed in class.

ATTENDANCE.

Attendance will not be taken. However, students are responsible for all material covered in lectures whether or not they attend any given lecture. Lecture slides posted online do not contain all of the material discussed in class and are not an adequate substitute for attending lectures.

SOFTWARE.

Stata will be used for classroom demonstrations, but you may use any statistical software you wish to complete the assignments. If you choose *Stata*, any reasonably modern version (version 12 or greater) is suitable for the course. *Stata* is available in the social sciences computing lab and can be purchased or leased from [stata.com](http://www.stata.com) at a discounted price from,

<https://www.stata.com/order/new/edu/profplus/student-pricing/>

starting at \$48USD for a six-month lease on the “basic” edition. Note that this edition is limited relative to more expensive versions, but is sufficient to complete the assignments for this course, and likely sufficient for most research projects. However, you may wish to spend a little more and upgrade to the “standard edition” if you intend to use *Stata* for a large research project.

CONTACTING THE INSTRUCTOR.

Questions regarding class material should usually be posed during class or in person during office hours. It is not usually feasible to provide lengthy explanations of class material over email. Should you send email for whatever reason, please put “Econ 545” in the subject line. If you do not receive a response from me within 48 hours, please resend your email.

TRAVEL PLANS.

Students are advised not to make work or travel plans until after the examination timetable has been finalized. Students who wish to finalize their travel plans at an earlier date should book flights that depart after the end of the examination period. There will be no special accommodation if travel plans conflict with the examination.

ELECTRONIC DEVICES.

Only basic calculators (with no alpha-numeric capabilities) are permitted during exams. Please note you may not use your cell phone or similar device as a calculator during exams.

During lectures, I ask you to respect both me your colleagues and refrain from using laptops or other devices to access material which may be distracting (*Stata* is not distracting. Youtube is distracting, even if, as I assume, you are watching a video about econometrics.)

POLICY ON INCLUSIVITY AND DIVERSITY.

The University of Victoria is committed to providing an environment that affirms and promotes the dignity of human beings of diverse backgrounds and needs.

OTHER POLICIES.

All standard University of Victoria and Department of Economics policies apply in this course, including but not limited to those available at the following links.

[Department of Economics course policies](#)

[University of Victoria academic integrity policies.](#)