

York University | Fall 2025 | AP/Econ 4210 3.0 A: Econometrics

– Syllabus –

Official description

The objective of this course is to provide students with a number of tools for conducting and understanding empirical research in economics. The focus of the course will be on empirical methods for cross-sectional and panel data. The main topic of the course is the linear regression model, its estimation and inference. We cover least squares and maximum likelihood estimators. Other topics include heteroskedasticity, endogeneity, instrumental variable estimation, and simultaneous equations, difference-in-differences. In addition to analytic exercises, students will receive practical questions requiring handling and analyzing data using the statistical software package R. Prerequisite: AP/ECON 3500 3.00 or 3210 3.00. Course credit exclusions: GL/ECON 4260 3.00, SC/MATH 3330 3.00. Note: This course can be taken alongside Econ 4140.

Note: Econ 3500 is **not** required for this course, provided you've taken Econ 3210. It is highly recommended you have at least **one** of Econ 3210 or Econ 3500.

This is an intermediate-level course in econometrics for students at the York (Keele campus). The goal is to equip you with a modern approach to data analysis and econometrics, focusing on the use of data to answer causal questions. You will learn about different empirical techniques that economists use: random assignment, linear regression, difference-in-differences, and instrumental variables. The workhorse of the course is the linear regression model, its estimation and inference. You will also get hands-on experience in R and R Markdown: obtaining and cleaning data, creating visualizations, estimating econometric models, and presenting results clearly.

Lectures and Office Hours

	Day	Time	Duration (min)	Place
Lecture:	T	14:30	~ 60-80	ACW 304
Tutorial:	T	16:30	< 60	ACW 304
Office Hours (Ben):	F	2:30	~ 60	Zoom

Lectures

Before each lecture, you are expected to do the required readings. Readings will usually be taken from the textbook, but will occasionally come from additional sources, typically via reading/video that I will create and post.

Tutorials

In the tutorials, we deal with the practical application of the concepts and methods used in class. This will involve R and Rstudio. You must have a working computer, a current installation of R and Rstudio and an internet connection.

Please bring your laptop to class so that you can fully benefit from the tutorials

Office Hours

I will be available for office hours. During these times students are encouraged to drop into a zoom session. If you cannot attend the scheduled office hours, I will be available by appointment as well.

E-mail and the course message board

Please use the **eClass message board** for course questions; I aim to reply within one business day. I do **not** answer content questions via e-mail. For personal or private matters, e-mail is appropriate; we can arrange a Zoom meeting if needed.

Course Work and Exams

The course is broken down into two parts. Each part reflects a focus of a group of lectures.

Part I: Core Regression & Inference (≈ 6 lectures)

Part II: Program evaluation and machine learning (≈ 5 lectures)

Each Part contains:

1. **Quizzes** on MyLabs (3 per Part).
2. **An Assignment** in RStudio submitted on eClass (2 per Part).
3. **A Practice Exam** (optional, for **bonus**; +0 / +1.5 / +3 points added to the **Part grade**, capped at 100%).
4. **An in-class Part Exam** (registrar-scheduled for Part II).

There is no separate cumulative final. Each Part ends with its own exam (two exams total). The Part II exam is registrar-scheduled but has the same format as the Part I exam and focuses on Part II material. **Exams are not cumulative**, but the material will build as we progress through the course.

Course Work

Course work includes **quizzes, assignments, and practice exams**. These are completed outside of class and submitted either through **MyLab** or **eClass** (not by e-mail).

1. **Quizzes** (6 total: 3 in Part I, 3 in Part II)
 - Online, auto-graded in MyLabs.
 - Question formats: numeric, multiple choice, and true/false.
 - You may attempt each quiz **twice** before the deadline.
 - Deadlines:
 - Part I quizzes are due **the day before the Part I exam**.
 - Part II quizzes are due **before the end of the semester**.
 - You can complete quizzes any time before the due date.
2. **Assignments** (4 total: 2 in Part I, 2 in Part II)
 - Applied data analysis in **RStudio**, building on concepts from class.
 - Instructions and due dates are posted well in advance on eClass.
 - You will have at least **14 days** to complete each assignment.
 - Each assignment is graded from **0–20 points**.
 - It is your responsibility to allow enough time to complete the work and handle any technical issues.
3. **Practice Exams** (2 total: 1 in Part I, 1 in Part II)
 - Optional, but highly recommended — they prepare you for the real exams.
 - Format and style are similar to the actual Part exam.
 - Submissions earn **bonus points** added to your Part grade:
 - 0 points = not submitted

- 1.5 points = submitted, but less than 50% correct/complete
- 3 points = submitted, with 50% or more correct/complete
- Note: Bonus points can raise your grade but cannot push it above 100%.

Course work grade

The course work grade is calculated as follows: **Quizzes = 60%, Assignments = 40%**.

Accessibility: Students requiring accommodations should contact Student Accessibility Services and the instructor as early as possible.

Exams

There will be two (2) exams throughout the semester, one for each part of the course. The first will be held in class, and the last will be scheduled by the registrar.

Exam materials: Closed-book. A one-page formula sheet will be provided. Non-programmable calculators permitted.

Deferred Standing (Deferred Exam Requests) If you need to request a deferred exam for this course, submit the Department of Economics MachForm:

- **ECON Deferred Exam Request (MachForm):** <https://www.yorku.ca/laps/econ/undergraduate-programs/academic-resources/departments-policies/deferred-standing/>

Grading Scheme

Your final grade in each Part (Part I and Part II) is based on **Exams (60–75%)** and **Coursework (25–40%)**, with the exact formula depending on your exam performance:

$$\text{Exam} \left\{ \begin{array}{ll} \geq 75 & \text{grade} = \max(0.60 \cdot \text{Exam} + 0.40 \cdot \text{Coursework}, 75) \text{ i.e., course work cannot hurt your grade} \\ [60, 75) & \text{grade} = \max(0.65 \cdot \text{Exam} + 0.35 \cdot \text{Coursework}, 60) \text{ i.e., course work cannot hurt your grade} \\ < 60 & \text{grade} = \min(0.75 \cdot \text{Exam} + 0.25 \cdot \text{Coursework}, 70) \text{ i.e. course work can only minimally help your grade} \end{array} \right.$$

- **Coursework = Quizzes + Assignments**
 - Quizzes = 60% of Coursework
 - Assignments = 40% of Coursework
- **Practice Exams:** Bonus marks from practice exams are added **after** your Part grade is calculated. Bonus can raise your grade but not above 100%.
 - *Example:* If your Part I grade is 77% and you earn +3 bonus points, your final Part I grade becomes 80%.

Why This System?

- **Fairness:** Exams are central — grades reflect independent mastery.
- **Support:** Honest effort on quizzes and assignments helps, especially if your exam score is in the 60–75 range.

- **Integrity:** Coursework alone cannot carry you to a top grade if exam performance is weak.

Take-away:

- If you do well on exams, coursework can only help you.
- If your exam is in the mid-range, coursework can lift you but not pull you below 60.
- If your exam is below 60, coursework provides only a small boost (capped at 70)

Table 2: Student Examples Under the Grading Scheme

Exam	Coursework	Scheme	Final Grade	Explanation
90	80	1	86.0	Strong exam; coursework helps a little. Grade at least 75 guaranteed.
75	60	1	75.0	At threshold: coursework does not pull you below 75.
70	80	2	74.5	Mid-range exam: coursework boosts grade; floor of 60 applies.
65	50	2	62.8	Coursework does not hurt; grade stays above 60.
55	90	3	65.0	Weak exam: coursework helps a little, but capped below 70.
40	100	3	55.0	Very weak exam: coursework cannot rescue you; capped at 70.

Final Grade

Your final course grade is the weighted average of the two Part grades:

Table 3: Course Part Weights

Part	Weight
Part I	50%
Part II	50%

Schedule (Topics, Readings, Dates)

Posted on eClass and updated as needed. The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (e.g., A+ = 9, A = 8, B+ = 7, C+ = 5, etc.).

Important dates

Please find add/drop/withdrawal dates [here](#).

Required Course Materials

Textbook and Pearson MyLab:

MyLab Economics with Pearson eText for Introduction to Econometrics: \$162.49 CAD

MyLab is required for this course. Any version of the textbook is acceptable if you prefer a hard copy instead of an eText. This subscription allows access for up to 12 months.

Topics to be Covered

- Introduction to R, RStudio, and R Markdown
- Data wrangling and visualization

- Review: regression and inference
- Multiple regression: additional topics and issues
- Endogeneity and Instrumental Variables
- Panel data and Difference-in-Differences
- Limited dependent variables (time permitting)
- Program evaluation and the potential-outcomes framework
- Introductory prediction / ML for economists

Technical Requirements

We use eClass (mandatory) and MyLabs (mandatory). You should have a computer with a working installation of R and RStudio (or Posit). If you do not have a laptop, you can access R and RStudio in the campus computer labs. You will need a reliable internet connection to access course materials, submit assignments, and participate in online quizzes.

Academic Integrity

Why: Upholding high standards of Academic Integrity is essential for successful academic discourse, and to the pursuit of learning and scholarship. Respecting and enforcing these standards at our university ensures that the degree you earn is a strong signal of your learning and academic achievement.

How: You uphold high standards of Academic Integrity by:

- doing and submitting only your own work
- not permitting others to use your answers
- giving credit to others for their ideas and works, including the use of generative AI
- quoting your sources, correctly paraphrasing and summarizing

More information: If you have questions or concerns about what constitutes appropriate academic behaviour, please consult with me or seek additional resources.

Enforcement: York University takes its responsibility to uphold high academic standards very seriously. The Senate Policy on Academic Conduct outlines behaviours that constitute academic dishonesty and processes for addressing academic offences. Sanctions in cases of cheating can include temporary and permanent records on your transcript, suspension from the course, or suspension from the University.

It is not up to the instructor: If I observe behaviour that might involve academic dishonesty, I am required to report it. It is not up to me to judge whether the behavior was unintended, a minor infraction, a first-time infraction, etc. I am professionally bound to report any suspicious behavior.

Why Econ 4210?

1. Answering questions using data is a big deal:

In both the public and private sectors, decision/policy makers are increasingly relying on data to make informed, data-based decisions. As an example, there are some characteristics of several leading tech firms' job postings:

1. Netflix job posting keywords: Causal Inference; Experimental Design; Advertising Effectiveness,
2. Facebook's Data Science Team features RCTs and causal inference,
3. Amazon offers a reduced form/causal/program evaluation *track*,
4. Google seeks experience in experimental design and causal inference.

From a random Deliveroo job ad ([source](#)) looking for an economist:

Experimenting at this scale presents some unique challenges and we're investing heavily in building a world-class platform for designing, deploying, and analyzing product experiments. We're looking for experts in statistical inference and estimation to join our growing team of data scientists and help us develop innovative statistical solutions for industrial-scale experimentation.

And its not just the private sector – policy evaluation is an important part of government decision making at all levels. **Answering causal questions using data is what this course is about.**

2. You plan on getting a graduate degree

This course, along with the other core economics courses, are essential for success in MA Economics programs. This course, in particular, is a strong signal of a students potential in an MA Economics program and, thus, highly useful in making admittance decisions. If you are planning on an MBA instead, this course is still a great fit, a strong signal of potential, and will help set you apart from other candidates a bit. In Master's of Public Policy and Master's of Public Administration programs, this course will help you get a leg up on their statistical and program evaluation courses.

3. You want to stand out

There are just under 2500 economics majors at York (Keele) and only about 25 students take this course per year (roughly, just over 1 percent). You want to be in this **1 percent**.

Why R?

1. Its free

R is a free, open-source programming language for statistical computing. All of our work in this class will be done using R. You will need regular, reliable access to a computer running an up-to-date version of R. [Download here](#)

RStudio is a free, open-source, industry leading, R programming environment. It contains a built-in code editor, many features to make working with R easier, and works the same way across different operating systems. Use of RStudio is required for the labs, and strongly recommended in general. [Download here](#)

R markdown provides an authoring framework for data science. You can use a single R Markdown file to both:

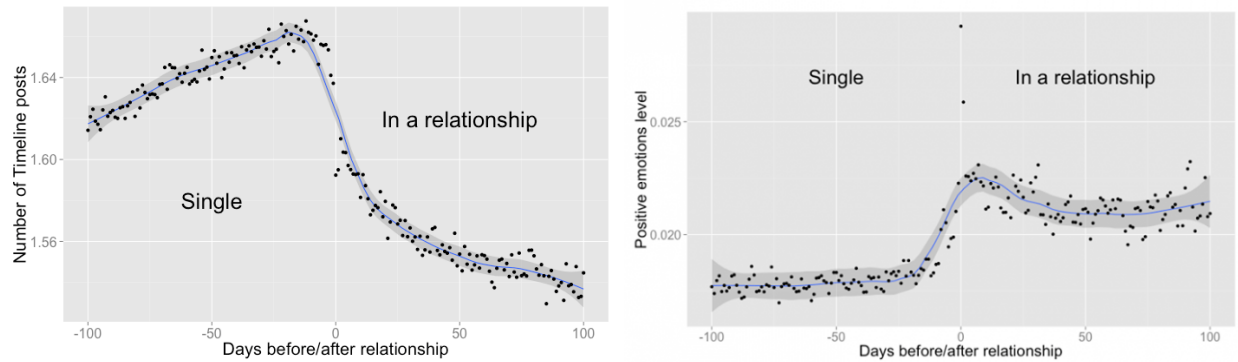
1. save and execute code,
2. generate high quality reports that can be shared with an audience.

2. You'd like a job at some point, and R can help.

R is used in nearly every industry, particularly in fields that require data analytics. Many large companies use R ([source](#)):

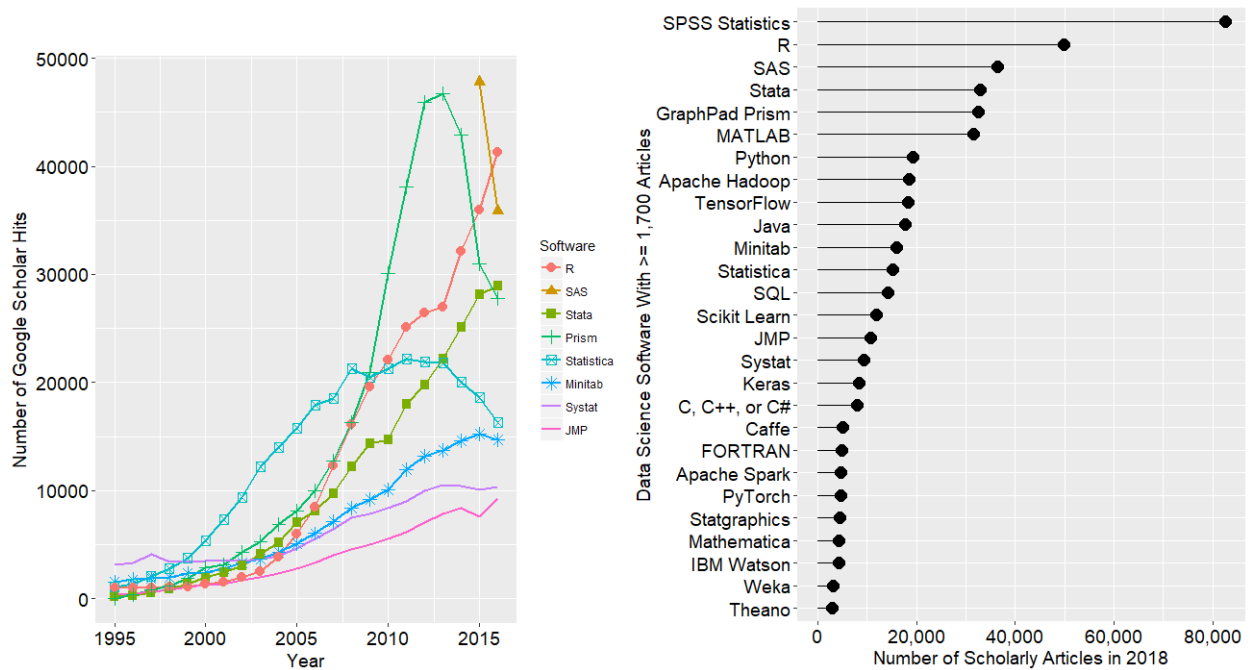


At facebook, R is used for data analytics and visualization, among other things ([source](#)):



3. R is popular and growing in cutting-edge research

R's popularity is growing in scholarly research ([source](#)).



Don't take it from me, here are some other sources:

1. [Fast Company](#),
2. [Turn a hobby into a career](#),
3. [8 Reasons](#),
4. [Because these guys use R, and they do great data visualization](#).