THE UNIVERSITY OF CHICAGO
HARRIS SCHOOL OF PUBLIC POLICY

# PPHA 42100: Applied Econometrics

**Winter 2025**

- subject to change -


**Instructor:** Ingvil Gaarder
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**Description:** This class covers linear regression from basic Gauss-Markow theory to the LATE theorem. Think of it as a theoretical course for applied researchers.

**Prerequisites:** Matrix algebra and mathematical statistics.

**Lectures:** This course consists of in-person lectures from 11:00 - 12:20 pm on Tuesdays and Thursdays in Keller 0010. Lectures are mandatory and I will take attendance.

**TA sessions:** Lectures are complemented with weekly TA sessions from 3:00 - 4:20 pm on Fridays. The first part of the TA sessions will be used to go through concepts from class and answer questions from the Pizza board. The second part of the TA session will be office hours. TA sessions are not mandatory, but will be extremely helpful. I will not have time to cover coding in class; instead, this will take place through the TA sessions. These sessions are strongly encouraged for all students.

**Web site:** All materials for the class will be posted to its site on Canvas.

**Piazza course discussion board:** Students should post questions about the material and problem sets on the Piazza course discussion board available through Canvas integration. Clarifying questions will be answered at the Piazza board, while more substantial questions will be addressed in TA sessions. Please note that questions are not answered over the weekend.

**Requirements and grading**: The final grade for the course will be a function of three problem sets, a midterm exam, and a final exam. Problem sets will count for 1/3 of the course grade, the midterm will count for 1/3 of the course grade, and the final exam will count for 1/3 of the course grade.

**Problem sets:** Problem sets will include paper-and-pencil problems and empirical exercises. Answers must be typed. You may work in groups consisting of up to 3 students, but you should submit your own set of answers written in your own words. If you worked on a problem set in a group, you should include the name of whom you have worked with on the top of the first page. The empirical portion of the problem sets should be completed using either R or Stata. You may share code with other students in your group. *No late problem sets will be accepted.* Make sure you give yourself ample time to submit. Answer keys will be posted to Canvas shortly after the problem sets are due. Due dates are as follows:

- Problem set 1: Tuesday 1/21 at 6:00 pm
- Problem set 2: Tuesday 2/11 at 6:00 pm
- Problem set 3: Tuesday 2/25 at 6:00 pm

Problem sets will be turned in via Gradescope. You can find the Gradescope shortcut on the left side of your Canvas menu. Please submit your code along with the writeup of your answers to each problem as a PDF. Please include tables, figures, and other relevant output from your code inside your writeup. You may not write your answers to each problem as comments inside your code (unless you use R Markdown in an appropriate way). In order to include your coding work in the PDF, you have two options:

1. Save your .R or .do file as a PDF and attach it to your homework PDF with the rest of your assignment.
2. If you are so inclined, use R Markdown to knit your code + rest of your assignment together into a PDF.

**Examinations:**

- Midterm exam: In-person. Date and time TBA.
- Final exam: distributed Monday 3/10. The final exam will be a take-home exam. You must do your own work (this includes analysis, interpretation, writing, and code) and may not discuss the work with anyone before it is due. We will cross check both the writeup and the code. It will be due 48 hours after it is distributed. Late exams will receive a zero.

**Re-grade policy:** If you wish to submit a regrade request for an assignment, you must submit a request for a specific question through the Gradescope regrade request system within 4 days of the release of grade release. Regrade requests submitted later than 4 days will not be considered.

*Some guidelines*: regrade requests should only be made for idiosyncratic grading errors made by the grader. If you have questions about the interpretation of a questions or the solution, DO NOT submit a regrade request in this case. Please bring your questions to office hours or post on the Piazza discussion board, and your instructor can provide guidance on whether you should submit a regrade request.

**Academic honesty:** The Harris School has a formal policy on academic honesty that you are expected to adhere to. Examples of academic dishonesty include (but are not limited to) turning in someone else's work as your own, turning in the same written text as someone else on a problem set/exam, copying solutions to past years' problem sets, and receiving any unapproved assistance on exams. All students suspected of academic dishonesty will be reported to the Harris Dean of Students for investigation and adjudication. The disciplinary process can result in sanctions up to and including probation and expulsion. If you have any questions regarding what would or would not be considered academic dishonesty in this course, please do not hesitate to ask.

Students who violate academic honesty policies, will in addition to be reported to the Harris Dean of Students, receive a zero for the problem set or exam in question.

**ADA accommodations:** Any student who believes they may need assistance should contact the Office of Student Disability Services. For more information, see https://disabilities.uchicago.edu/.

**References:** The text for the class is William Greene, *Econometric Analysis*, 8th edition. If you choose to use a different edition, the responsibility for cross-walking the reading assignments lies with you. Other course readings, made available via Canvas, will supplement the text.

**Topics and readings:**
*Incomplete and subject to change*

1. Multivariate Linear Regression
   (a) The linear regression model, Greene Ch. 2.2
   (b) Least squares regression, Greene Ch. 3
   (c) Statistical properties of least squares estimators, Greene Ch. 4.2-4.3
2. Finite-sample inference
   (a) The normality assumption, Greene Ch. 4.3.6

(b) Hypotheis testing in finite sample, Greene Ch. 4.2-4.3

3. Large-sample inference

   (a) Asymptotic properties of least squares estimators, Greene Ch. 4.4
   (b) Large sample tests, Greene Ch. 5.4

4. Heteroskedasticity and Generalized Least Squares

   (a) Heteroskedasticity, Greene Ch. 9.4-9.6
   (b) Non-Spherical Disturbances and OLS, Greene Ch. 9.2
   (c) Generalized Least Squares, Greene Ch. 9.3

5. Specification Issues

   (a) Dummy variables, Greene Ch. 6.2
   (b) Non-linearity, Greene Ch. 6.3
   (c) Structural Breaks, Greene Ch. 6.4
   (d) Omitted Variable Bias, Greene Ch. 4.3.2
   (e) Collineariy, Greene Ch. 4.7.1

6. Models for Panel Data

   (a) Models, Greene Ch. 11.1-11.2
   (b) Esimators, Greene Ch. 11.3-11.6, 11.1
   (c) Additional references to be added

7. Instrumental Variables

   (a) Greene Ch. 8
   (b) Additional references to be added

8. Binary Response Models