Applied Microeconometrics

AEB 7573 Section REG1, Class #26023 (3 credit hours)
Class periods: Tuesday, period 8-9, 3:00 pm – 4:55 pm
Thursday, period 9, 4:05 pm – 4:55
Location: MAEB 0238
Academic Term: Fall 2025

Instructor:
Dr. Conner Mullally
1107 McCarty Hall B
352-294-7680
connerm@ufl.edu

Office Hours: Tuesday and Thursday 9 – 10 am or by appointment, in 1107 McCarty B or via Zoom (https://ufl.zoom.us/my/connermullally).

Course description
This is an applied econometrics course focused on estimating treatment effects, that is, causal effects of changes in the economic environment on people, communities, states, countries, or any other individual unit of analysis.

The econometric tools covered by this course are best described as the standard methods of applied microeconomics. Applied microeconomics emphasizes the use of transparent empirical methods with clear causal interpretations that avoid strong modeling assumptions. The applied microeconomic approach can be found in virtually any subfield of economics where applied work is common.

Methods covered in this course include randomized experiments, matching and regression, instrumental variables, difference-in-differences, regression discontinuity designs, and methods for performing statistical inference when assumptions like normality and independent error terms fail.

The course features readings and weekly lectures but emphasizes hands-on learning through weekly lab sessions. There are two versions of every problem set: one for R and one for Stata. Please use one of these two programs. Better yet, use this class as an opportunity to improve your skills at both. If you do not own Stata you can run it using UF Apps (http://info.apps.ufl.edu), or Stata/IC can be rented for 6 months by students from the Stata website (do not rent Small Stata).

Prerequisites
AEB7572 or ECO7436 or an equivalent graduate-level course on statistics and multiple regression.

Course objectives
This course has two objectives:
1. Ensure that you understand the econometric tools of applied microeconomics.
2. Ensure that can apply these tools in R and/or Stata.

Material and Supply Fees
None

Required textbooks
None

Helpful Texts & Reading
1. Hansen, Bruce. 2019. "Econometrics".
   https://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf.
2. Imbens, Guido and Jeffrey Wooldridge. "What's New in Econometrics?" http://www.nber.org/minicourse3.html. This is a set of lecture notes, slides, and videos describing many of the methods covered in the class.
3. Morgan, Stephen and Christopher Winship. Counterfactuals and Causal Inference: Methods and Principles for Social Research. New York: Cambridge University Press, 2007.
4. Woolridge, Jeffrey. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press, 2002.
5. Cameron, A. Colin and Pravan Trivedi. Microeconometrics: Methods and Applications. New York: Cambridge University Press, 2005. There is a helpful webpage for the book: http://cameron.econ.ucdavis.edu/mmabook/mmaprograms.html.
6. Statalist, an online bulletin board where you can ask other Stata users for help and find answers to questions not readily solved elsewhere: http://www.stata.com/statalist.
7. Stackoverflow (https://stackoverflow.com/) for all of your R questions.
8. CrossValidated, the StackExchange statistics site (https://stats.stackexchange.com/).
9. The DIME Wiki (https://dimewiki.worldbank.org/wiki/Main_Page). DIME is the World Bank Development Impact Evaluation team. They also have a useful blog: https://blogs.worldbank.org/impactevaluations.

The most important text for the course are the slides posted for each topic on Canvas. There will also be assigned readings from various sources, the two most important of which are "Mostly Harmless Econometrics" by Josh Angrist and Jörn-Steffen Pischke ("MHE" henceforth) and "Causal Inference: The Mixtape" by Scott Cunningham ("The Mixtape" henceforth). I have placed one copy of MHE on reserve at Marston Science Library. The Mixtape can be downloaded at https://www.scunning.com. Other readings are available online.

Course Schedule

On the course Canvas site, under the "Modules" tab, you will find lecture notes as well as required and recommended readings for each module. Required readings from MHE and The Mixtape are not on Canvas.

Week	Activity (lecture, reading, discussions, etc)	Important dates	Assignments Due
1	Course introduction	Start date 8/21	None
2	Introduction to the Rubin Causal Model, causal diagrams, threats to causal inference		
3	Randomized experiments	Labor day 9/1	Problem set 1, 9/2
4	How to structure an empirical paper		Problem set 2, 9/9; Empirical paper deadline 1, 9/9
5	Linear regression		Problem set 3, 9/16
6	Matching methods		Problem set 4, 9/23
7	Robust inference I		Problem set 5, 9/30
8	Robust inference II: cluster-robust inference		Problem set 6, 10/7; Empirical paper deadline 2, 10/7
9	Instrumental variables I: the basics	Homecoming 10/17	Problem set 7, 10/14
10	Instrumental variables II: local average treatment effects		Problem set 8, 10/21
11	Difference-in-differences		Problem set 9, 10/28
12	Regression discontinuity designs		Problem set 10, 11/4; Empirical paper deadline 3, 11/4
13	Multiple hypothesis testing adjustments	Veteran's Day 11/11	Problem set 11, 11/12 (note the Wednesday due date); Empirical paper deadline 4, 11/12
14	Paper presentations		Problem set 12, 11/18; Presentation slides, 11/18
15	N/A	Thanksgiving— All week	
16	Paper presentations	Class ends: 12/3	Final empirical paper deadline, 12/2

Assignments

1) **Problem Sets: 120 points total (due by 11:59 pm on Tuesday each week, except on holidays, beginning September 2nd and ending November 18th)**
   - You will complete 12 problem sets, each of which is worth 10 points. Each problem set will consist of one or more of the following:
     - "Lab" questions where you apply concepts learned in class to data from published papers.
     - Methodological questions related to the concepts covered in class.

   - Each week, you will turn in the following:
     - Your code and any other relevant output (e.g., tables or figures) showing your work from that week's lab problems. Your code must be organized so that I can tell which pieces address each question in the problem sets, with comments that help organize the steps used to solve each problem.
     - Typed or neatly handwritten responses to any methodological problems. You may type your answers in the code containing your work for that week's lab questions.

2) **Empirical project: 60 points total (deadlines: 9/9, 10/7, 11/4, 11/12, and 12/2)**
   - Your empirical project can take one of two forms:
     1. A replication and extension of an existing paper.
     2. An original empirical research paper.

   The requirements for the empirical project and what I expect to receive at each deadline are on Canvas.

3) **Presentation of empirical paper: 10 points total**
   Presentations will be given during our last three class meetings, and if necessary, outside of class.

Reading list
Use the guide below to determine how closely you should read anything from the list below:
= Required, No stars = Recommended (i.e., read for your own benefit)

1. Introduction to the Rubin Causal Model, causal diagrams, threats to causal inference
   a. *MHE Chapter 1
   b. *The Mixtape, "Directed Acyclic Graphs".
   c. *The Mixtape, "Potential Outcomes Causal Model", section 4.1.
   d. Knox, D., W. Lowe, and J. Mummolo. 2020. "Administrative Records Mask Racially Biased Policing." *American Political Science Review* 114(3): 619-637. https://www.cambridge.org/core/journals/american-political-science-review/article/administrative-records-mask-racially-biased-policing/66BC0F9998543868BB20F241796B79B8
2. Randomized experiments
   a. *MHE Chapter 2

    b. Duflo, E., R. Glennerster, and M. Kremer. "Using Randomization in Development Economics Research: A Toolkit." Technical Working Paper 333. Cambridge, MA: National Bureau of Economic Research, 2006. http://www.nber.org/papers/t0333.

    c. Bloom, H. 1995. "Minimum Detectable Effects: A Simple Way to Report the Statistical Power of Experimental Designs." *Evaluation Review* 19(5): 547-556. http://erx.sagepub.com/cgi/content/abstract/19/5/547.

    d. Miguel, E. and M. Kremer. 2004. "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities." *Econometrica* 72(1): 159-217.

    e. Baird, S., A. Bohren, C. McIntosh, and B. Ozler. 2014. "Designing Experiments to Measure Spillover Effects." Penn Institute for Economic Research Working Paper 14-006. https://docs.google.com/file/d/17O7mmhAt2AiiIbhi_iahtopRuNuDGZ2QyKfMOMbn5TR6EcnZzRgZlR0oK3gJ/edit.

3. How to structure an empirical paper
    a. *"The Introduction formula" https://blogs.ubc.ca/khead/research/research-advice/formula

    b. *"The Conclusion Formula" http://marcfbellemare.com/wordpress/12060.

    c. * Bellemare, Marc. 2020. "How to Write Applied Papers in Economics." http://marcfbellemare.com/wordpress/wp-content/uploads/2020/09/BellemareHowToPaperSeptember2020.pdf

    d. Cochrane, John. 2005. "Writing Tips for Ph.D. Students."

    e. Ristovska, Ljubica. 2019. "Coding for Econs."

    f. Shapiro, Jesse. "How to Give an Applied Micro Talk."

4. Linear regression
    a. *MHE Chapter 3 (through 3.3.1)

    b. Hansen, B. 2019. "Econometrics" Sections 2.14, 2.18-19, 2.24, 2.25, 2.28, 2.30.

    c. Blog post by Winston Lin: https://blogs.worldbank.org/impactevaluations/regression-adjustment-in-randomized-experiments-is-the-cure-really-worse-than-the-disease.

    d. Aronow, P. and C. Samii. 2016. "Does Regression Produce Representative Estimates of Causal Effects?" American Journal of Political Science, 60(1): 250-267. http://onlinelibrary.wiley.com/doi/10.1111/ajps.12185/full.

    e. Solon, G., S. Haider, and J. Wooldridge. 2015. "What Are We Weighting For?" The Journal of Human Resources 50(2): 301-316. http://jhr.uwpress.org/content/50/2/301.full.pdf.

    f. Słoczyński, T. 2022. "Interpreting OLS Estimands When Treatment Effects Are Heterogeneous: Smaller Groups Get Larger Weights." *The Review of Economics and Statistics* 104(3): 501-509. https://doi.org/10.1162/rest_a_00953

5. Matching
    a. *MHE Chapter 3 (3.3.2 through the end of chapter 3)

    b. *The Mixtape, "Matching and Subclassification."

    c. King, G. and R. Nielsen. 2019. "Why Propensity Scores Should Not Be Used for Matching." *Political Analysis* 2019(27): 435-454

    d. Imbens, G. 2015. "Matching Methods in Practice." *The Journal of Human Resources* 50(2): 373-419. http://jhr.uwpress.org/content/50/2/373.full.pdf+html.

e. Özler, B., Ç. Çiğdem, S. Cunningham, P. Cuevasa, and L. Parisotto. 2021. "Children On the Move: Progressive Redistribution of Humanitarian Cash Transfers among Refugees." *Journal of Development Economics* 153.

6. Robust inference with independent data
   a. *MHE Chapter 8
   b. MacKinnon, J. and H. White. 1985. "Some Heteroscedasticity-Consistent Covariance Matrix Estimators with Improved Finite Sample Properties." *Journal of Econometrics* 29(3): 305-325. http://www.sciencedirect.com/science/article/pii/0304407685901587.

7. Robust inference with dependent data
   a. *Cameron, A. and D. Miller. "A Practitioner's Guide to Cluster-Robust Inference." *The Journal of Human Resources* 50(2): 317-372. http://jhr.uwpress.org/content/50/2/317.short.
   b. *Abadie, A., S. Athey, S., G. Imbens, J. Wooldridge. 2023. "When Should You Adjust Standard Errors for Clustering?" *The Quarterly Journal of Economics* 138(1): 1-35. https://academic.oup.com/qje/article/138/1/1/6750017. See the accompanying presentation by Guido Imbens: https://youtu.be/fCrezQAu6A8

8. Instrumental variables: the basics
   a. *MHE Chapter 4, Sections 4.1 – 4.1.3, 4.2.1
   b. *The Mixtape, "Instrumental Variables" through Section 7.5
   c. Angrist, J. and A. Krueger. 1991. "Does Compulsory School Attendance Affect Schooling and Earnings?" *The Quarterly Journal of Economics* 106(4): 979-1014. http://www.jstor.org/stable/2937954.
   d. Bound, J., D. Jaeger, R. Baker. 1995. "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak." *Journal of the American Statistical Association* 90(430): 443-450. http://www.jstor.org/stable/2291055?seq=1#page_scan_tab_contents.
   e. Stock, J. and M. Yogo. 2005. "Testing for Weak Instruments in Linear IV Regression." In *Identification and Inference for Econometric Models*. D. Andrews, ed. Cambridge University Press, New York. http://scholar.harvard.edu/stock/publications/testing-weak-instruments-linear-iv-regression.
   f. Wooldridge, J. 2015. "Control Function Methods in Applied Econometrics." *The Journal of Human Resources* 50(2): 420-445. http://jhr.uwpress.org/content/50/2/420.full.pdf+html.
   g. Keane, M. and T. Neal. 2024. "A Practical Guide to Weak Instruments." *Annual Review of Economics* 16: 185-212. https://doi.org/10.1146/annurev-economics-092123-111021.
   h. Goldsmith-Pinkham, P., I. Sorkin, and H. Swift. 2020. "Bartik Instruments: What, When, Why, and How." *American Economic Review* 110(8): 2586-2624. https://www.aeaweb.org/articles?id=10.1257/aer.20181047.
   i. Borusyak, K., P. Hull, and X. Jaravel. 2025. "A Practical Guide to Shift-Share Instruments." *Journal of Economic Perspectives* 39(1): 181-204. https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.20231370.

9. Instrumental variables: Local Average Treatment Effects (LATE)
   a. *MHE Chapter 4, Section 4.4. Sections 4.5 and 4.6 are optional.

       b. *The Mixtape, "Instrumental Variables", sections 7.6 through the end

10. Difference-in-differences
       a. *The Mixtape, "Difference-in-Differences".
       b. Autor, D. 2003. "Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing." *Journal of Labor Economics* 21(1): 1-42. http://www.jstor.org/stable/10.1086/344122.
       c. de Chaisemartin, C. and X. D'Haultfoeuille. 2023. "Two-Way Fixed Effects and Difference-in-Differences with Heterogeneous Treatment Effects: A Survey." *The Econometrics Journal*, 26(3): C1-C30. https://doi.org/10.1093/ectj/utac017.
       d. Goodman-Bacon, A. 2021. "Difference-in-Differences with Variation in Treatment Timing." *Journal of Econometrics* 225(2): 254-277. https://doi.org/10.1016/j.jeconom.2021.03.014.
       e. Callaway, B. and P. Sant'Anna. 2021. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics* 225(2): 200-230. https://doi.org/10.1016/j.jeconom.2020.12.001.
       f. Sun, L. and S. Abraham. 2021. "Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects." *Journal of Econometrics* 225(2): 175-199. https://doi.org/10.1016/j.jeconom.2020.09.006.
       g. Borusyak, K., X. Jaravel, and J. Spiess. 2023. "Revisiting Event Study Designs: Robust and Efficient Estimation." https://arxiv.org/abs/2108.12419.
       h. Rambachan, A., and J. Right. 2023. "A More Credible Approach to Parallel Trends." *The Review of Economic Studies* 90(5): 2555-2591. https://doi.org/10.1093/restud/rdad018.
       i. Caetano, C. and B. Callaway. 2023. "Difference-in-Differences with Time-Varying Covariates in Parallel Trends Assumption." https://arxiv.org/pdf/2202.02903.pdf.

11. Regression discontinuity designs
       a. *MHE Chapter 6
       b. *The Mixtape, "Regression Discontinuity"
       c. Cattaneo, M. and R. Titiunik. 2021. "Regression Discontinuity Designs." *Annual Review of Economics* 14(1): 821-851. https://www.annualreviews.org/doi/abs/10.1146/annurev-economics-051520-021409

12. Adjusting for multiple hypotheses
       a. *Anderson, M. 2008. "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects." *Journal of the American Statistical Association* 103(484): 1481 – 1495. http://amstat.tandfonline.com/loi/uasa20.

Attendance
Class attendance is expected. Students should inform instructors of expected absences.

Policy on Cell Phone Use
Cell phones will be turned off and not answered during class. Non-emergency, in-class text messaging is not acceptable.

Makeup Policy
If you know you will need to makeup an assignment, please contact the instructor as soon as possible. Late assignments that have been excused by the instructor can earn at least half credit as long as assignment keys are not used regardless of whether they are available on Canvas. You are welcome to use your classmates as a resource for completing makeup assignments. Additional points beyond half credit can be awarded at the discretion of the instructor.

Excused Absences
Excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation. See additional information at: Attendance Policies.

E-Learning
There is an e-learning webpage for this course. To access E-learning you need your Gatorlink username and password. The site can be accessed at http://lss.at.ufl.edu. Click the "e-learning in Canvas" button. If you have difficulty accessing the page, contact UF computing Help Desk at (352) 392-HELP. Note that E-learning page may not be working the first week of class. Grades re posted under the 'Grades' tab and assignments will be posted under 'Assignments' on the home screen.

Grading Scale (letter grade and points)

A	176-190
A-	171-175
B+	163-170
B	157-162
B-	152-156
C+	144-151
C	138-143
C-	133-137
D+	125-132
D	119-124
D-	114-118
E	0-113

I reserve the right to revise this grading scale during the semester as necessary. Grading scale revisions can only positively affect your grade.

Evaluation of Grades

Item	Percent
Problem sets	5.3% each (63.2% total)

Empirical project deadlines 1 - 4	2.6% each (10.5% total)
Empirical project deadline 4	21%
Empirical project presentation	5.3%

More information on UF grading policy at:

UF Graduate Catalog

Grades and Grading Policies

This course adheres to all UF Academic Policies: https://go.ufl.edu/syllabuspolicies