

## Applied Microeconometrics

AEB 6933 Section MECM, Class #29419 (3 credit hours)

**Class periods:** Tuesday, period 6, 1:55 pm – 2:45 pm

Thursday, period 6-7, 1:55 pm – 3:50

**Location:** [MAEB 0238](#)

**Academic Term:** Spring 2022

### Instructor:

Dr. Conner Mullally

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352-294-7680

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**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 persons, 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). You must have a laptop that you can bring to class to work on lab assignments.

### 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. Wooldridge, 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](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 Harm-less 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.

## Topic Outline

- Week 1:** Introduction to the Rubin Causal Model, causal diagrams, threats to causal inference
- Week 2:** Randomized experiments
- Week 3:** How to structure an empirical paper, with emphasis on the introduction
- Week 4:** Linear regression
- Week 5:** Matching methods; matching versus regression
- Week 6:** Robust inference with independent data
- Week 7:** Robust inference with dependent data
- Week 8:** Instrumental variables, part 1: the basics
- Week 9:** Instrumental variables, part 2: local average treatment effects
- Week 10:** Difference-in-differences
- Week 11:** Regression discontinuity designs
- Week 12:** Adjusting for multiple hypothesis testing

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 are not on Canvas.

## Assignments

- 1) **Problem Sets: 120 points total (due by 11:59 pm on Thursday each week)**
  - 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: 2/4, 3/4, 4/1, 4/15, and 4/28)**
  - Your empirical project can take one of three forms:
    1. A replication and extension of an existing paper.
    2. An original empirical research paper.

You will meet with me to gain approval for your project before getting started. The requirements for the empirical project and what I expect to receive at each deadline are on Canvas.

## 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”, pages 85-95 (from “Potential outcomes” to just before “STAR Experiment”).
  - 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\\_iahtopRuNuDGZ2QyKfMO\\_Mbn5TR6EcnZzRgZIR0oK3gJ/edit](https://docs.google.com/file/d/17O7mmhAt2AiiIbhi_iahtopRuNuDGZ2QyKfMO_Mbn5TR6EcnZzRgZIR0oK3gJ/edit).
3. How to structure an empirical paper
  - a. \* “The Introduction formula” <https://s3.wp.wsu.edu/uploads/sites/285/2015/08/The-Introduction-Formula.pdf>.
  - b. \* “The Conclusion Formula” <http://marcfbellemare.com/wordpress/12060>.
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>.
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. 2017. “When Should You Adjust Standard Errors for Clustering?” Unpublished manuscript. <http://www.nber.org/papers/w24003>. 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](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. Angrist, J. and M. Kolesár. 2021. “One Instrument to Rule Them All: The Bias and Coverage of Just-ID IV.” arXiv:2110.10556 [econ, stat]
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. See the list of references in the slides.
11. Regression discontinuity designs
- a. \*MHE Chapter 6
  - b. \*The Mixtape, “Regression Discontinuity”
  - c. Cattaneo, M. and R. Titiunik. 2021. “Regression Discontinuity Designs.” arXiv:2108.09400 [econ, stat]
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. Excessive unexcused absences will result in negative consequences.

### **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	167-180
A-	162-166
B+	154-161
B	149-153
B-	144-148
C+	136-143
C	131-135
C-	126-130
D+	118-125
D	113-117
D-	108-112
E	0-107

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
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Problem sets	5.6% each (67% total)
Empirical project deadlines 1 - 4	2.8% each (11% total)
Empirical project deadline 4	22%

**More information on UF grading policy at:**

[UF Graduate Catalog](#)

[Grades and Grading Policies](#)

**Students Requiring Accommodations**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

**Course Evaluations**

The University expects students to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. [Click here for guidance on how to give feedback in a professional and respectful manner](#). Students are notified via email from GatorEvals when the evaluation period opens; have access to evaluations through the email, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). [Summaries of course evaluation results are available to students here](#).

**University Honesty Policy**

UF students are bound by The Honor Pledge, which states, *“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.”*

[The Honor Code](#) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

**Software Use**

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, the University will take disciplinary action as appropriate.

**Student Privacy**

Federal laws exist, which protect your privacy with regard to grades earned in courses and individual assignments. For more information, please see the [Notification to Students of FERPA Rights](#).



## **Campus Resources:**

### **Health and Wellness**

[U Matter, We Care](#): if you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 392-1575 so that a team member can reach out to the student.

[Counseling and Wellness Center](#): 392-1575, and University Police 392-1111 or 9-1-1 for emergencies

Sexual Assault Recovery Services (SARS): [Student Health Care Center](#), 392-1161

[University Police Department](#), 392-1111, [police@ufl.edu](mailto:police@ufl.edu), or 9-1-1 for emergencies

### **Academic Resources**

[E-learning technical support](#), 392-4357 (select option 2) or email [Learning-Support@ufl.edu](mailto:Learning-Support@ufl.edu)

[Career Resource Center](#), Reitz Union, 392-1601. For career assistance and counseling

[Library Support](#), Various ways to receive assistance with respect to using the libraries or finding resources.

[Teaching Center](#), Broward Hall, 392-2010, 392-6420. General study skills and tutoring.

[Writing Studio](#), 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

[Student Complaints](#) (on campus students)

[Student Complaints](#) (online students)