

AEB 7571: Econometric Methods I

Spring 2023

Instructor: Prof. Patrick S. Ward

Lecture: MWF 3:00 PM – 3:50 PM

Office hours: Tuesday 10:00 AM – 11:00 AM
Thursday 3:00 PM – 4:00 PM

Email: wardp@ufl.edu

Lecture location: Turlington B310

Office hour location: McCarty B 1121

Phone: (352) 294-9050

Course Description: Linear and nonlinear econometric models, serial correlation, heteroscedasticity, errors in variables, qualitative variables, specification errors, and simultaneous equation models.

Credits: 3

Grading scheme: Letter grade

Prerequisites: MAS 2103, STA 4322

Communication: E-mail (either to my email address or via Canvas messaging) is the best way to reach me. Any issues that require action **MUST** be handled by email so that there is a written record of need. Phone calls or after class conversations are not likely to result in action. Class cancellations, changes in office hours, meeting locations, or the syllabus will be announced on Canvas. Be sure that you receive those notifications in a timely manner (controlled in your Canvas settings).

Because of the nature of the problem sets and application exercises, I will not provide assistance on problem sets or application exercises over email; if you have specific questions, please plan to attend office hours. If you have not made efforts to solve the problem, I will not provide hints on how to do so. It is not necessary for you to make appointments during office hours. Visitors will be seen on a first-come, first-served basis. Groups of students are encouraged.

Course motivation (or, “Why you should be excited about taking this course”): The appropriate use of econometric methods to study and interpret economic data is an essential skill in applied economics. Although many statistical software packages have been developed that greatly simplify the process of econometric modeling, they often operate as a “black box” where the user enters some input and the software produces a result, but the user has no idea how the input is transformed into the output. While some might argue that ignorance is bliss, there is a risk that such rote reliance on computing software can result in the use of improper methods, a reliance on unrealistic assumptions, or an improper interpretation of the results. This course will emphasize the finite sample and asymptotic theories of some fundamental econometric frameworks for estimating linear and nonlinear economic relationships, and exercises programming econometric estimators using matrix formulations in R will give you a peek inside the black box to help students better understand the mechanics of econometric estimation.

Expected Student Learning Outcomes: After the successful completion of AEB 7571, a typical student should be able to:

- Have a general understanding of econometric theory and the properties of and assumptions that underly some widely used econometric frameworks.

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- Apply appropriate econometric methods in the analysis of real data, demonstrating an understanding the mechanics of the estimation procedure and the proper interpretation of the results.
- Create or recreate an individual product of economic research using econometric methods.

Course Materials:

- **Primary texts:**

Econometric Analysis (8th edition), by William H. Greene. 2018. Pearson Press. ISBN: 0134461363.

Econometrics, by Bruce Hansen. 2022. Princeton University Press. ISBN: 9780691235889

- **Other texts that may prove helpful:**

Econometric Analysis of Cross-Section and Panel Data, by Jeffrey Wooldridge. 2010. MIT Press.

A Guide to Econometrics (5th edition), by Peter A. Kennedy. 2003. MIT Press.

- **E-learning:** There is an [E-Learning Canvas webpage](#) for this course that can be accessed using your GatorLink username and password. If you are having difficulties accessing E-learning, please contact the UF Computing Help Desk by calling (352)-392-HELP or via email helpdesk@ufl.edu.
- **Other:** This course combines theoretical and analytical concepts with practical application. As such, students are expected to have or develop a basic knowledge programming in R. If you do not have an adequate background in R, you may access a number of resources on the internet, such as Analytics Using R (<https://pubs.wsb.wisc.edu/academics/analytics-using-r-2019/>), Introduction to Econometrics with R (<https://www.econometrics-with-r.org>), or LinkedIn Learning (available from <http://elearning.ufl.edu>).

Class Structure: The class format is that of a traditional lecture combined with example applications. Lectures will be recorded and posted on Canvas to provide equal access to all students, but to maximize your learning experience, you should attend every class.

Course Assignments and Expectations:

Problem sets: These are meant to give you opportunities to master some of the econometric methods that we discuss in the regular class meetings. There will be 6 problem sets over the course of the semester, so you will be expected to stay up-to-speed with the material that is covered in class. Most problem sets will require econometric estimation, and unless otherwise stipulated, I expect these to be completed using brute force methods in R. Working on problem sets is a key ingredient of this course because it is one of the best ways to assess your understanding and to help you solidify new concepts. You should find that the problem sets are more challenging than the examples presented in class. This is a PhD-level course, so the problem sets will be intentionally challenging – and sometimes, they may prove to be unintentionally challenging. Working on challenging problems helps stimulate higher-order thinking, deepens your understanding of the material, and provides an opportunity to think creatively and independently. You may benefit from working together in small groups – and indeed cooperative work is encouraged – but it is nonetheless expected that each individual will submit their own set of answers to problem sets to be eligible for maximum credit.

Final project: You will have an option to work on *either* an original applied research project or a replication project. You will record your poster presentation and submit through Canvas along with software code and output supporting your poster. Details will be provided as we move through the semester.

OPTION 1: Original Research Poster (preferred)

- This is an *applied* econometrics research project. The format of final submission for this option is a poster.
- This option may be preferable if you want to start working on analyzing data for your dissertation or a conference submission. FRE students can leverage this option for their required presentation at the FRE Day of Research. A poster is very brief version of a complete research paper.
- Examples of acceptable forms of contribution for Option 1, besides starting an original work, includes extending a previous work and data set (e.g., different industries, countries, regions), adding/testing alternative variables, conducting different specification tests, or using alternative conceptual/theoretical frameworks.
- Poster size is optional, but, I recommend creating your poster as a 36" (H) × 48" (W) Power Point slide (One .ppt(x) slide can be as large as 56" × 56"). Here are a good set of tips for designing your poster in Power Point:
http://www.aaea.org/UserFiles/file/Poster_Powerpoint_AgEcon_Search.pdf
- The easiest way to design a poster is to use a PPT poster template. You can find a plethora of examples by searching Google. There is also a template from the UF Center for Undergraduate Research:
<https://cur.aa.ufl.edu/wp-content/uploads/2021/02/Symposium-Poster-Template.pptx>
- UF has a cost-effective poster printing facility in the HUB 224.
- Your poster should have the following section headings:

Introduction: Give some background, describe the problem and tell the audience why it is an interesting one.

Model: The economic and/or econometric model behind your research question.

Methods and Data: Describe the econometric method you use and your data.

Findings: This section should only have graphs, charts, and tables with minimal text.

Discussion: What are your conclusions from the findings?

OPTION 2: Replication Paper

- The format of this option is a paper (~10 to 15 pages). The final paper should be written up in a manuscript format.
- Good alternatives for replications are seminal papers that allow you to become familiar with a method or a data set that you are considering using in your dissertation.
- The ideal final paper will describe the initial article, carefully delineate the ease with which the results replicate, and propose/carry out extensions or improvements to the research design.
- If your paper is very well-done, it can be submitted for publication either as a comment in the original journal, or in one of several journals that accept replications. For example, the *Journal of Applied Econometrics* publishes replications of papers that were originally published in *Econometrica*, *American Economic Review*, *Journal of Political Economy*, *Quarterly Journal of Economics*, *Review of Economics and Statistics*, *Journal of*

Econometrics, Journal of Business and Economic Statistics, and Economic Journal. There are several other outlets for a well-done replication study.

More things to consider, regardless of the option selected:

- The problem at hand must be *empirical*, using real data.
- The project must be distinct from other class projects you might have been assigned, and it must be feasible so that it can be completed by the *end of semester*.
- Regardless of the option, you do not have to go beyond basic econometric methods that we will discuss in the course for a satisfactory grade. The main purpose of the project is to give you an overall experience in designing empirical research and using econometric methods appropriate for answering your particular research question. However, if you feel motivated to utilize your work for later submissions, you are welcome to go beyond the material covered in class.
- Do not use a class/homework data set verbatim, even for the replication assignment.
- To find an interesting topic for your project, I suggest getting in touch with faculty members working on topics you find interesting. This is also an excellent time to identify a potential advisor, if you do not have one yet. Scanning recent empirical journals and working papers (e.g., *Journal of Applied Econometrics, American Journal of Agricultural Economics, IDEAS, AgEcon Search, the NBER working paper series, etc.*) is another good way of finding an interesting research question.
- About a month into the semester (February 10, 2023), you will submit a **one-to-two page outline of your proposed project** with brief descriptions of the *research question*, the econometric *methods* you will employ, and the *data* you will use (number of observations, type, variables, source, availability etc.). If you are going to replicate or extend another paper, please attach the original paper to your outline. Provide the data file you plan to use.
- Regardless of the option you choose, by April 26, 2023, you must submit (1) your poster or replication paper, (2) your own code for the analysis, (3) exact data used to run that code, and (4) the original paper (only if your project is replication or extension of a published paper).
- Unlike your homework assignments, the final project *can* be done using canned software programs, such as STATA, or commands (such as `lm` or `glm`) or packages (such as AER – Applied Econometrics in R, in which the `ivreg` command can be found) in R. Matrix language programming is not required for the final term project.

Exams: There will be two exams over the course of the semester. The first exam will be held on March 10, 2023 (covering material from the first half of the semester) and the second exam will be held on April 26, 2023 (covering material from the second half of the semester). Both exams will be held in class.

Composition of Final Score:

Course Assignments	Total Points
Problem sets (6)	300 points (50 points each)
Final project	300 points
- Proposal (February 10, 2023)	- 50 points
- Final product (April 26, 2023)	- 250 points
Exam 1 (March 10, 2023)	200 points
Exam 2 (April 26, 2023)	200 points
Total	1000 points

Letter grade distribution:

Grade	Percentage	Total points	Grade Points
A	93% or more	≥ 930	4.00
A-	90.0 – 92.9%	900 - 929	3.67
B+	86.0 – 89.9%	860 - 899	3.33
B	83.0 – 85.9%	830 - 859	3.00
B-	80.0 – 82.9%	800 - 829	2.67
C+	76.0 – 79.9%	760 - 799	2.33
C	73.0 – 75.9%	730 - 759	2.00
C-	70.0 – 72.9%	700 - 729	1.67
D+	66.0 – 69.9%	660 - 699	1.33
D	63.0 – 65.9%	630 - 659	1.00
D-	60.0 – 62.9%	600 - 629	0.67
E	59.9% or less	≤ 629	0.00

This class adheres to UF grading policies:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Grades and Grade Points: For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Academic Honesty: As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*”

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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.*” It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams).

Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. **If a student is deemed to have violated the Honor Code on an assignment, they will receive zero points on that assignment. Repeated violations will be reported to the Dean of Students Office for consideration of disciplinary action.** For more information regarding the Student Honor Code, please see:

<https://sccr.dso.ufl.edu/process/student-conduct-code/>

Plagiarism: The Student Honor Code and Student Conduct Code states that:

"A Student must not represent as the Student’s own work all or any portion of the work of another. Plagiarism includes but is not limited to:

- Stealing, misquoting, insufficiently paraphrasing, or patch-writing.

- Self-plagiarism, which is the reuse of the Student’s own submitted work, or the simultaneous submission of the Student’s own work, without the full and clear acknowledgment and permission of the Faculty to whom it is submitted.
- Submitting materials from any source without proper attribution.
- Submitting a document, assignment, or material that, in whole or in part, is identical or substantially identical to a document or assignment the Student did not author."

COVID-19 University Policy: As Gators, we are characterized by our resilience as well as our commitment to caring for one another. In that vein, the university welcomes – but does not require – people to wear masks on campus. Further, in alignment with guidance from the Centers for Disease Control and Prevention as well as UF Health, we continue to encourage everyone to get vaccinated to minimize their risk of complications from COVID-19. To learn more about COVID-19 vaccines, testing and related topics, visit <https://coronavirus.ufhealth.org>.

Attendance and Make-Up Work: Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>. In general, you are expected to be in class each day and submit all work on time on Canvas.

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 Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students are notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are: (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge: “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 Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. [Click here to read the Conduct Code](#). 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, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

In this course, we make heavy use of the statistical computing package R. R is a free, open-source programming environment that will run on a variety of platforms (e.g., MacOS, Windows, Unix/Linux, etc.). R is widely used among academics from a variety of academic disciplines, and is increasingly being adopted by economists. Because there is such a wide user community, there are a plethora of user-written “packages” that have been developed that can tackle most of the challenges you would ever encounter. In addition, with so many users, it is unlikely that you are the first person to ever encounter a particular econometric or programming issue, and consequently it is very easy to find resources online that can help you circumvent (almost) any challenge you may encounter. You may find R-bloggers (<http://www.r-bloggers.com>) and Stack Overflow (<http://stackoverflow.com>) especially useful.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on 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 someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).

University Police Department: [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

Academic Resources

E-learning technical support: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.

Student Complaints On-Campus: [Visit the Student Honor Code and Student Conduct Code webpage for more information](#).

On-Line Students Complaints: [View the Distance Learning Student Complaint Process](#).

Lauren’s Promise: I will listen and believe you if someone is threatening you.

Lauren McCluskey, a 21-year old honors student athlete, was murdered on October 22, 2018, by a man she briefly dated on the University of Utah campus. We must all take actions to ensure this never happens again. Any form of sexual harassment or violence will not be excused or tolerated at the University of Florida.

If you are experiencing sexual assault, relationship violence, or stalking, you can take the following actions:

- If you are in immediate danger, call 911.
- Report it to me, and I will connect you to resources.
- Seek confidential sources of support and help:
 - [UFPD Office of Victim Services](#): 51 Museum Road, 352-392-5648
 - [Sexual Assault Recovery Services \(SARS\)](#): Infirmary Building, 352-392-1161
 - Alachua County Rape Crisis Center (confidential): 352-264-6760

Diversity, Equity, and Inclusion: The University of Florida’s College of Agricultural and Life Sciences (CALs) supports the University of Florida’s commitment to diversity, equity, and inclusion. By fostering a sense of belonging for students, staff, and faculty, while leveraging the uniqueness of the people who study and work at the university, we believe our campus community is enriched and enhanced by diversity, including but not limited to, race, ethnicity, national origin, gender, gender identity, sexuality, class, and religion. This course will support an understanding of the diversity of our distance and campus communities as well as our agricultural and natural resource communities, locally and globally.

This course will strive to create a learning environment for students that supports a diversity of thoughts, perspectives, and experiences while honoring your identities. In this class we will take the following approaches to help achieve this:

- All course participants will use the names and pronouns provided by students for use in class. If these differ from those that appear in official university records, you can change your Display Name at One.UF.
- If your performance in this course is being impacted by your experiences inside and/or outside the classroom, do not hesitate to contact the instructor and/or teaching assistant (TA). Instructors in CALs are a great resource for you and you may provide feedback anonymously. Feedback may result in general announcements to the class, if necessary, or reporting to appropriate UF personnel to address your concerns.
- CALs instructors and TAs like many people, are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that makes you feel uncomfortable, please discuss with your instructor or TA or contact the CALs Dean’s Office (cals-dean@ufl.edu).

Tentative Course Schedule:

Week	Dates	Content
1	Jan 9, 11, 13	Introduction; conditional expectations; algebra of least squares
2	Jan 16	Martin Luther King, Jr. Day
	Jan 18, 20	Finite sample properties of least squares
3	Jan 23, 25, 27	Asymptotic properties of least squares; coding least squares in R
4	Jan 30, Feb 1, 3	Nonshperical distributions; restrictions on parameters and hypothesis testing
5	Feb 6, 8, 10	Restrictions on parameters and hypothesis testing; coding restricted least squares in R; sources of endogeneity
6	Feb 13, 15, 17	Instrumental variables (IV) regression; asymptotic properties of the IV estimator; overidentified models and two-stage least squares (2SLS)
7	Feb 20, 22, 24	Testing for endogeneity and control functions; coding instrumental variables and 2SLS in R; introduction to maximum likelihood estimation
8	Feb 27, Mar 1, 3	Properties of maximum likelihood estimators; estimation procedures for maximum likelihood estimation
9	Mar 6, 8	Testing restrictions in the maximum likelihood framework; coding maximum likelihood estimators in R
	Mar 10	Exam I
10	Mar 13, 15, 17	Spring Break
11	Mar 20, 22, 23	Motivation, estimation, and inference in binary dependent variable models; coding probit and logit estimators in R
12	Mar 27, 29, 31	Method of moments; moment equations; Generalized Method of Moments (GMM); OLS and 2SLS as special cases of GMM; asymptotic properties of GMM estimator; covariance matrix estimation
13	Apr 3, 5, 7	Coding GMM estimation in R; introduction and motivation for panel data estimation; panel data structure
14	Apr 10, 12, 14	Pooled OLS, fixed and random effects; Hausman specification test; coding panel data models in R
15	Apr 17, 19, 21	Differences-in-differences (DiD) estimation for causal inference
16	Apr 24	Recent advances in DiD estimation
	Apr 26	Exam II

Note: The instructor reserves the right to change the terms and dates stated in this course syllabus at any time. Any changes will be communicated on e-learning as an announcement. It is solely the student's responsibility to stay informed of any changes.

****By enrolling in this course, you are agreeing to the terms outlined in this syllabus!****