

# Econometrics

Please ensure you are viewing the correct syllabus. This semester, there are two sections of ECO 4421, and several important details, such as exam dates and other key deadlines, differ between the sections.

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<b>Location:</b>	MAT 103
<b>Class Hours:</b>	M & W 4:05PM - 6:00PM

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<b>Instructor:</b>	Jay Lee
<b>Email:</b>	jeongwoo@ufl.edu
<b>Office:</b>	MAT 324
<b>Office Hours:</b>	T & R 4:00PM - 5:00PM or by appointment

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<b>TA:</b>	Eric Bodnar
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<b>Office:</b>	MAT 301A
<b>Office Hours:</b>	R 11:30AM - 1:30PM

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**Course Description** This course covers the statistical tools needed to understand empirical economic research. The emphasis is on understanding the theoretical concepts that are used by economists to summarize, communicate, and estimate economic relationships and to evaluate policy. Topics include statistical inference, simple and multiple regression analysis with cross-sectional data, hypothesis testing, and OLS asymptotics.

**Course Objectives** The course has the following objectives:

1. Understand the theoretical concepts that are used by economists to summarize, communicate, and estimate economic relationships and to evaluate policy.
2. Learn the practical intuition of general statistical concepts, including standard errors, hypothesis testing, and confidence intervals.
3. Learn the basics of working with data.
4. Learn the basics of the R statistical programming language.
5. Learn to use simulation in R to get hands-on practice with theoretical concepts (such as the Law of Large Numbers), and to explore the consequences of incorrect assumptions.
6. Learn the dangers of relying on assumptions that do not typically hold in economics.

## Prerequisites

- Introduction to Statistics 1 (STA 2023)
- Survey of Calculus (MAC 2233) or higher level of math courses
- Intermediate Microeconomics (ECO 3101) or Managerial Economics (ECP 3703)

Students should be familiar with basic concepts in probability theory and statistical inference. They are also expected to have familiarity with basic calculus. Students should be comfortable with drawing and interpreting graphs, taking partial derivatives, and using algebra to manipulate equations. If anyone has any questions about this matter, I will be happy to discuss them in the first week of the semester.

**Course Requirements** Each week there are two lectures including recitations.

In addition to class discussion, the readings, and lecture slides, there are weekly quizzes, and 3 problem sets. The weekly quizzes are done through Canvas. The problem sets have both analytical and computer-exercise components. The statistical analysis will be done using R. Help for new R users will be given in recitation.

## Course Materials

- Lecture slides will be uploaded after each class.
- The main recommended textbook is as follows.
  - Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*. 7th ed., Cengage Learning
- The optional textbooks are as follows.
  - James H. Stock and Mark Watson, *Introduction to Econometrics*, Pearson
  - Joshua D. Angrist and Jörn-Steffen Pischke, *Mastering 'Metrics: The Path from Cause to Effect*, Princeton University Press

Class discussion is the main material, and lecture slides will summarize the main points. Students can use the textbooks when they do not understand something that happened in class or when they want to reinforce an idea that came up in class. Additionally, students can use the textbook problems for their own studying. I will inform you which chapters are relevant for each class.

**Software and Programming** Some of the problem sets in the course will involve simulation or empirical analysis and will require the use of a statistical software. R is the statistical software for this course. You will likely find RStudio to be a more user-friendly way of using R. You are not required to have any knowledge of R or other programming experience, but you must be willing to learn. It is recommended that you install R and RStudio Desktop (both free and open source) on your personal computer. If for some reason that is not convenient for you, R and RStudio are installed on many computers around campus (e.g., Marston Science Library), as well as on UF apps: <https://info.apps.ufl.edu/published-applications/>.

**Evaluation** Your grade will depend on your performance on exams, problem sets, quizzes, and an empirical research project. Your final grade will be calculated as follows:

Exam 1	25%
Exam 2	25%
Exam 3	25%
Problem Sets	20%
Quizzes	5%

Your final letter grade<sup>1</sup> will be determined as follows:

93 – 100	<i>A</i>
90 – 92.99	<i>A–</i>
87 – 89.99	<i>B+</i>
83 – 86.99	<i>B</i>
80 – 82.99	<i>B–</i>
75 – 79.99	<i>C+</i>
70 – 74.99	<i>C</i>
65 – 69.99	<i>C–</i>
60 – 64.99	<i>D+</i>
55 – 59.99	<i>D</i>
0 – 54.99	<i>E</i>

## Exam Dates

- Exam 1:** Monday, Sep 30th in class  
**Exam 2:** Wednesday, Oct 30th in class  
**Exam 3:** Wednesday, Dec 4th in class

Exams will take place in the classroom. You need to bring your fully-charged laptop to take the exam. We will use the Canvas quiz for exams even though they are in-person exams. (Honorlock proctoring is not provided for our class.) You can use a calculator that has NO communication functions. You are NOT allowed to use the calculator feature in your phone or your laptop. There will be NO cumulative exams, but you will need to understand the concepts in the earlier chapters to proceed to the advanced chapters.

**Make-up Exams** If you have an excused conflict (e.g., a religious holiday) with any exam this semester, please email me by the end of the first week of class.

Make-up exams will be administered only on those circumstances in which you cannot take an exam for a valid reason according to UF policy. In that case, you should notify me prior to the start of the examination. In addition, you will need to provide valid documentation (within a week) justifying your absence.<sup>2</sup> Supporting documentation related to excuses for missed exams must include contact information for verification purposes. Failure to comply with these rules will result in a zero score in the missed exam. Providing false documentation or creating a false excuse constitutes cheating under the University guidelines. UF's policy on academic honesty will be strongly enforced.

<sup>1</sup>More information on grades and grading policies is here: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

<sup>2</sup><https://shcc.ufl.edu/forms-records/excuse-notes/>

**Problem Sets** There will be 6 problem sets. I encourage you to work together, but each student has to submit their own solutions. Solutions should be scanned and submitted in Canvas. Your scanned submission should be high-quality and professionally presented. All problem sets are due 12:00PM on the due date. Late submissions will not be accepted and will receive zero credit. The due dates are as follows.

Problem Set 1: Monday, Sep 16th, 12:00PM.  
Problem Set 2: Monday, Sep 23rd, 12:00PM.  
Problem Set 3: Monday, Oct 21st, 12:00PM.  
Problem Set 4: Monday, Oct 28th, 12:00PM.  
Problem Set 5: Tuesday, Nov 12th, 12:00PM.  
Problem Set 6: Monday, Nov 18th, 12:00PM.

**Quizzes** There will be approximately one quiz for a class. (The total of 20 quizzes.) You are free to refer to the textbooks or your notes when you solve these quizzes. These quizzes should be done through the Canvas by 11:59PM of the next day after each class. Late submissions will not be accepted and will receive zero credit. At the end of the semester, only the best 15 quizzes are used for calculation of the final quiz score. Each of the 15 scores will be equally weighted to determine your overall quiz average.

**Course Communications** All class activities will take place during our assigned class time. You are expected to be available during those times. Since this class is a face-to-face course, you are expected to stay in Gainesville throughout this semester. You are responsible for all information made available through classes and Canvas. You should confirm your availability (exams, problem sets, quizzes) before the end of Drop/Add Week and adjust your schedule accordingly.

Most of our one-on-one communication will occur via email. Three important course policies regarding email are as follows: 1) I expect that you read your email at least once per day, and 2) All emails that you send must follow basic rules for professional correspondence.

**Class Attendance** Class attendance is required. Excused absences are consistent with university policies in the undergraduate catalog<sup>3</sup> and require appropriate documentation. If you are sick but still want to attend class, you can access the Zoom link for the class on Canvas.

**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 education 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 deliver by an instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture

<sup>3</sup><https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

does not include lab sessions, student presentations, clinical presentation 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 guest 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 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<sup>4</sup> 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 in this class.

**Generative AI related Policy** The Department of Economics faculty assume that all work that is submitted for grading is written by the student whose name it bears, and that it represents their ideas and work. Accordingly, students are not permitted to use generative AI when completing assignments, quizzes, exams, or other graded work unless their instructor has expressly granted that permission. Unauthorized use of generative AI may constitute cheating and/or plagiarism. Such violations of the UF Student Honor Code will be reported to the UF Dean of Students Office and will be subject to severe sanctions.

Generative AI includes but is not limited to ChatGPT, DALL-E, and Google Bard.

**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 will be 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/>.

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<sup>4</sup><https://sccr.dso.ufl.edu/process/student-conduct-code/>

**Students with Disabilities** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

**UF Teaching Center** The UF Teaching Center offers guidance on study skills and tutoring services. You can find more information at: <https://umatter.ufl.edu/office/teaching-center/>

### Health Counseling and Emergencies

**U Matter, We Care** If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center** <http://www.counseling.ufl.edu/cwc>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Assault Recovery Services (SARS)** Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

## Course Outline

### 1. Introduction to Econometrics

- Week 1: [Econometrics and Economic Data]
- Week 2: [Simple Regression Model]
- Week 3: [Estimation]
- Week 4: [Gauss-Markov Theorem]
- Week 5: [Exam 1]

### 2. Inference and OLS Asymptotics

- Week 1: [Testing Hypotheses]
- Week 2: [t Test]
- Week 3: [F Test]
- Week 4: [Causal Effects and Policy Analysis]
- Week 5: [Exam 2]

### 3. Further Issues

- Week 1: [Functional Form and Goodness of Fit]
- Week 2: [Dummy Variable]
- Week 3: [Linear Probability Model]
- Week 4: [Heteroskedasticity]
- Week 5: [Exam 3]