

#### ECON 471

#### Course Syllabus

#### Introduction to Applied Econometrics

**Semester:** Fall 2023

**Meeting Details:** MW, 3:30PM – 4:50PM, 141 Wohlers Hall

**Credits:** 3 undergraduate hours, 4 graduate hours

**Instructor:** Joshua Shea

**Email:** [jkshea@illinois.edu](mailto:jkshea@illinois.edu)

**Office Hours:** Tuesdays 4:30PM – 5:30PM, 123 David Kinley Hall

**TAs:** Victor Exequiel Funes Leal, Hong Rui Pu

**Emails:** [victorf2@illinois.edu](mailto:victorf2@illinois.edu), [hpu5@illinois.edu](mailto:hpu5@illinois.edu)

#### Course Description:

This course introduces you to basic econometrics, which is about applying statistical and mathematical tools with data to study economic relationships. We will focus on understanding linear regression methods and how they can be used for causal inference. An important component of the course is building and linking your economic intuition with mathematics and statistics. Don't lose sight of the economics underlying what we are doing this semester. It will not only provide intuition, but also be the source of important problems and beautiful solutions. Another important component will be learning to code in programming languages like R, Python, and Julia.

#### Prerequisites:

You are expected to have completed ECON 203 (Economic Statistics II), and either ECON 302 (Intermediate Microeconomic Theory) or ECON 303 (Intermediate Macroeconomic theory). You are thus expected to be familiar with basic concepts from statistics (e.g., random variables, hypothesis testing) and calculus (e.g., unconstrained optimization). Nevertheless, I will be reviewing a lot of this material in detail.

#### Learning Outcomes:

- Understand how to perform and interpret linear regressions.
- Understand the difference between correlational and causal relationships.
- Basic ability to process and analyze data using R, Python, Julia, or another equally-low level programming language (Stata and Excel are prohibited).

#### Learning Resources:

I will post notes that are written for the class. If you would like another reference, you can try Stock and Watson's *Introduction to Econometrics* or Wooldridge's *Introductory Econometrics*.

#### Course Structure:

Course meetings consist of lectures. Students are expected to attend all classes. Phones are not allowed

out during class at any point. If you wish to take notes on a computer, I request that you sit in the back rows so as not to distract other students.

**Requirements:**

- Assignments: There will be assignments posted online for you to practice implementing the materials covered in class.
- Two midterms: These will be held in class.
- Final Exam: There will be a closed book, 3-hour exam during finals week, which will cover the entire course material. It will be similar to the midterms in the format, but will be longer.

**COURSE POLICIES****Grading:**

The assignments are worth **20 percent** of the grade.

The first midterm is worth **20 percent** of the grade (cheat sheet allowed).

The second midterm is worth **25 percent** of the grade (cheat sheet allowed).

The final will be worth **35 percent** of the grade (cheat sheet allowed).

At the end of the semester, the grades will be averaged according to the weights above and curved.

**Assessment Policies:**

**You are welcome to work in groups of up to 4 students.** Make sure you attempt each question on your own, as only you can take your own exam. All assignments are to be turned in on Canvas by the due date and time. Late assignments receive *no* credit without an instructor-approved excuse. Acceptable excuses include physical and mental illness, and personal or family emergencies. A written request for an extension must be submitted at least 48 hours in advance.

**Graduate Students:** If you are taking the course for 4 credits, there will be a term paper due at the end of the year. You will be required to write a 5-10 page case study. You will have to come up with a research question, find a data set, and apply the methods covered in class to answer your research question. The report should be written as if it were prepared for an economic policy-maker.

**Exam Policy:** In the event that a student misses one of the exams, the instructor reserves the right to give the student a zero on that exam. There are no make-up exams without an instructor-approved excuse. Instructor approved excuses include 1) medical reasons, in which case you should bring a letter from a medical professional describing your reason for missing the exam, 2) death or serious illness of an immediate family member or close friend (documentation required), or 3) conflict with a religious holiday. Requests for exam make-ups should be made as far in advance as possible.

We will follow the University guidelines on student conflicts with final exams. For this year's student code, see <https://studentcode.illinois.edu/article3/part2/3-201/>.

**Statement on Academic Integrity:** According to the Student Code, 'It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions.' Please know that it is my

responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here: <https://studentcode.illinois.edu/article1/part4/1-401/>

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policies. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity. **Read the full Student Code at** <https://studentcode.illinois.edu/>

**Students with Disabilities:** To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call (217)-333-4603, email [disability@illinois.edu](mailto:disability@illinois.edu) or go to the DRES website.

Please also schedule a private meeting with the course instructor to discuss your needs and requirements. The instructor will attempt to meet all reasonable course accommodations once the student self-identifies. Please note that accommodations are not retroactive to the beginning of the semester, but begin the day you contact the instructor with a current letter of accommodation from DRES.

### **Community of Care**

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or <http://odos.illinois.edu/community-of-care/referral/>). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe. Further, we understand the impact that struggles with mental health can have on your experience at Illinois. Significant stress, strained relationships, anxiety, excessive worry, alcohol/drug problems, a loss of motivation, or problems with eating and/or sleeping can all interfere with optimal academic performance. We encourage all students to reach out to talk with someone, and we want to make sure you are aware that you can access mental health support at the Counseling Center (<https://counselingcenter.illinois.edu/>) or McKinley Health Center (<https://mckinley.illinois.edu/>).

For mental health emergencies, you can call 911 or walk into the Counseling Center, no appointment needed.

**Disruptive Behavior:** Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution for disciplinary action.

**Religious Observances:** The Religious Observance Accommodation Request form is available at <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/>. Submit the form to the instructor and to the Office of the Dean of Students ([helpdean@illinois.edu](mailto:helpdean@illinois.edu)) by the end of the second week of the course; in the case of exams or assignments scheduled after this period, students should submit the form to the instructor and to the Office of the Dean of Students as soon as possible.

**Family Educational Rights and Privacy Act (FERPA):** Any student who has suppressed their directory information pursuant to Family Educational Rights and Privacy Act (FERPA) should self- identify to the instructor to ensure protection of the privacy of their attendance in this course. See <http://registrar.illinois.edu/ferpa> for more information on FERPA. Student information and records will not be released to anyone other than the student unless the student has provided written approval or as required by law.

**Sexual Misconduct Reporting Obligation:** The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX and Disability Office. In turn, an individual with the Title IX and Disability Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here:

<http://www.wecare.illinois.edu/resources/students/#confidential>.

Other information about resources and reporting is available here: <http://wecare.illinois.edu/>.

### **Student Support**

The Counseling Center is committed to providing a range of services intended to help students develop improved coping skills in order to address emotional, interpersonal, and academic concerns. Please visit their website to find valuable resources and services:

<https://counselingcenter.illinois.edu/>.

**Counseling Center Information:** 217-333-3704

Location: Room 206, Student Services Building (610 East John Street, Champaign IL)

**McKinley Mental Health Information:** 217-333-2705

Location: 3rd Floor McKinley Health Center 1109 South Lincoln, Urbana, IL

**Emergency Dean:** The Emergency Dean may be reached at (217) 333-0050 and supports students who are experiencing an emergency situation after 5 pm, in which an immediate University response is needed and which cannot wait until the next business day. The Emergency Dean is not a substitute for trained emergency personnel such as 911, Police or Fire. If you are experiencing a life threatening emergency, call 911. Please review the Emergency Dean procedures:

<http://odos.illinois.edu/emergency/>

**Academic Dates and Deadlines:** Students should make note of important academic deadlines for making changes to their courses (add, drop, credit/no-credit, grade replacement, etc.).

<https://registrar.illinois.edu/academic-calendars>. Please check with your academic department regarding specific procedures and policies.

**Emergency Response Recommendations:** The university maintains guidelines for emergency responses. A list of recommendations when to evacuate and when to find shelter are available at:

[http://illinois.edu/cms/2251/general\\_emergency\\_response\\_recommendations\\_8\\_16\\_13\\_final.docx](http://illinois.edu/cms/2251/general_emergency_response_recommendations_8_16_13_final.docx)

Floor plans for specific buildings are available at: <http://police.illinois.edu/emergency-preparedness/building-emergency-action-plans/>

**SYLLABUS**

Below is a tentative syllabus. I prioritize depth over breadth, so this course carefully goes through the fundamentals of applied econometrics. As we progress during the semester, you may realize that you are seeing the same tool (linear regression) again and again, but in different forms. This tool goes surprisingly far, is the foundation to many more advanced econometric methods, and is the starting point for almost all empirical economic research.

**1. Probability theory and statistics**

- Random variables, distributions, and dependence/independence
- Unconditional and conditional expectations
- Sampling and basic estimators

**2. Univariate regression**

- Economic, econometric, and statistical models
- Exogeneity and endogeneity
- Identification of parameters
- Interpretation of parameters

**3. Multiple regression**

- Identification of parameters
- Interpretation of parameters

**4. Statistical inference**

- Estimation and properties of estimators
- Hypothesis testing
- Evaluating models

**5. Instrumental variables**

- Defining instrumental variables
- Identification of parameters
- Interpretation of parameters
- Statistical inference (estimation and hypothesis testing)

**EXAM DATES**

Midterm 1: Wednesday, September 20 (in class, 80 minutes)

Midterm 2: Wednesday, October 25 (in class, 80 minutes)

Final: Monday, December 11, 7pm – 10pm (room TBA).