

BASIC INFORMATION

COURSE PREREQUISITE(S): refer to Course Catalog

CLASS MEETINGS: 9:30–10:45am, Tuesdays and Thursdays, 12 Middlebush Hall (map)

ASSIGNMENTS DUE: Tuesdays at 11:59pm

INSTRUCTOR: David M. Kaplan; office hours in 326 Professional Bldg (map), 10:45am–12pm Tuesdays; email kaplandm@missouri.edu (only for personal matters; otherwise use Canvas Discussion Board)

TEACHING ASSISTANT: Xin Liu; office hours in 223 Professional Bldg (map), 1:00–3:00pm Mondays

TEXTS AND MATERIALS

TEXTBOOK: *Introduction to Econometrics*, Updated 3rd ed., by James H. Stock and Mark W. Watson. The electronic version is available automatically through Canvas via AutoAccess, for which you should have received a separate email (from the Mizzou Store); if you need help, please visit <https://www.themizzoustore.com/t-autoaccess.aspx> or email autoaccess@missouri.edu. The companion website is at https://wps.pearsoned.com/aw_stock_ie_3

SOFTWARE: we will use statistical software throughout the semester; you may choose to use either Stata or R. My brief opinion about the trade-off: Stata makes it much, much easier to do 95% of what applied economists do (and you can easily export a dataset to run a function in R for the other 5%), including everything we'll do this semester; but R is free and easier to write your own functions in, which may be helpful in certain fields or industries. R is open-source and freely available online to download onto your personal computer; for getting started, see (for example) the chapter “R: guide to (some) basics” at https://faculty.missouri.edu/~kaplandm/9476/Kaplan_9476_notes.pdf. R can also be used through a web browser on various sites like <https://jupyter.org/try> or https://www.tutorialspoint.com/r_terminal_online.php or <https://cocalc.com/>. Stata can be used (for free) either at Windows computing sites on campus or from home via Software Anywhere; see <https://doit.missouri.edu/software/software-anywhere.html> for details on getting connected. However, Software Anywhere can be very slow, depending on your internet connection speed and how many other students are using it at the same time. Since it is impossible to predict when other students will be using Software Anywhere, I strongly suggest doing the empirical assignments well before the deadlines if you use Software Anywhere.

CANVAS SITE: we will have a course site on Canvas, with course information, announcements, files, grades, etc.

COURSE DESCRIPTION

This class provides an introduction to econometrics. The treatment is more practical than theoretical (i.e., no proofs), but theoretical assumptions and results are discussed, and mathematical analysis provides deeper and more precise understanding of practical concerns. Practical methods covered include cross-sectional regression (linear and nonlinear in regressors), panel data estimators, methods

for binary outcomes, and instrumental variables, as well as methods for (classical) statistical inference. Stata or R statistical software is used for empirical examples. In addition to practical skills, there is an emphasis on critical thinking about causality and about interpreting results both economically and statistically.

COURSE GOALS (LEARNING OBJECTIVES)

By the end of the semester, you will be able to do the following.

- Define terms from probability, statistics, and econometrics, both mathematically and intuitively.
- Describe various econometric methods both mathematically and intuitively, including their objects of interest and assumptions, and the logical relationship between the assumptions and corresponding theorems and properties.
- Explain the frequentist/classical statistical and asymptotic frameworks, including their benefits and limitations.
- Provide multiple possible (causal) explanations for any statistical result, distinguishing between statistical and causal relationships.
- For a given economic question, dataset, and econometric method, judge whether the method is appropriate and judge the economic significance and statistical significance of the results.
- Using Stata or R: manipulate and analyze data, interpreting results both economically and statistically.

WEEKLY SCHEDULE AND ASSIGNMENTS

Not every assignment is mandatory! If you are enrolled in ECONOM 4371 (not 7371), then you may choose to submit any 9 exercise sets (of 13 possible ES) and any 4 empirical exercises (of 10 available). More specifically, your 4 lowest ES scores and 6 lowest empirical exercise scores will be dropped. Of course, you may still wish to do and submit all the ESs and empirical exercises.

If you're in ECONOM 7371, then you instead submit 8 empirical exercises. That is, your 2 lowest empirical exercise scores will be dropped (as well as your 4 lowest ES, same as above).

See Table 1 for the schedule of topics, assignments, and exams. In the Assessment column of the table, "ES" stands for "exercise set." Each ES is a set of multiple choice questions you complete in Canvas, corresponding to the chapter; e.g., in Week 1, when we cover Chapter 1, you work on "Exercise set for Chapter 1." Also in the Assessment column, "Empirical" refers to an empirical exercise, which consists of writing Stata or R code, along with some short verbal discussion; these assignments are also submitted through Canvas, where there are further details. The exams will all be through Canvas and multiple choice, very similar to the ESs, but with more questions and more restricted time (see Canvas for details). Note: "Week 16" means final exams week; due dates are month/day format.

Table 1: Schedule of topics, assignments, and exams.

Week	Chapter	Topic	Assessment	Due
1	1	Economic Questions and Data; software intro	ES; Empirical	8/28
2	2	Review of Probability	ES	9/4
3	3	Review of Statistics	ES; Empirical	9/11
4	4	Linear Regression with One Regressor	ES; Empirical	9/18
5	4	Linear Regression with One Regressor	ES	9/25
6	1–4	[review]	exam (in-class)	9/27
7	5	Hypothesis Tests and Confidence Intervals	ES; Empirical	10/9
8	6	Multiple Regressors	ES; Empirical	10/16
9	7	Tests and CIs (Multiple Regressors)	ES; Empirical	10/23
10	8	Nonlinear Regression Functions	ES; Empirical	10/30
11	5–8	[review]	exam (in-class)	11/1
12	9	Assessment of Regression Studies	ES	11/12
13	10	Panel Data	ES; Empirical	11/20
14	12	Instrumental Variables	ES; Empirical	12/4
15	13	Experiments and Quasi-experiments	ES; Empirical	12/11
16	all	[review Chapters 1–10, 12–13]	exam (12:30pm)	12/11

GRADING CRITERIA

Plus/minus grading is used in this course, and the final exam is mandatory. Relative weighting of assignments is shown in Table 2.

Table 2: Relative weighting of assignments (percent of total).

Assignment	Percent
ES	26
Empirical	20
Midterm exam #1	15
Midterm exam #2	15
Final exam	24
Total	100

Letter grades will be mapped in the usual way, i.e., A range is 90–100% (with 97.5% the threshold for A+ and 92.5% the threshold between A- and A), B range 80–89.99% (similarly for +/-), C 70–79.99%, D 60–69.99%, F below that. Any “curve,” if it seems appropriate, will *not* enforce predetermined grade *proportions* but rather move everyone up together; you are not competing with other students for a fixed number of A grades.

PENALTIES FOR LATE WORK

All assignments must be submitted in the manner instructed (e.g., online) before the beginning of class on the stated date. For online assignments, solutions will be available at that time. Late submissions will receive a score of zero.

Students are expected to take exams at the times scheduled in the syllabus. In case of an emergency such as serious illness, family emergency, or a legitimate conflict with recognized University activities, you must contact me immediately (i.e., before the exam) to request a makeup and provide documentation of the emergency. If you miss (and don't make up) both midterms or the final, then you will receive an "incomplete" for your semester grade.

GRADING QUESTIONS

Graded work will be returned at the end of class. You will have time to review the comments and ask questions. If you think something may be amiss—points added incorrectly, explanation misunderstood, etc.—then you may write a note and leave the work with me to review. If the item for review is non-trivial, I may review the entire work and adjust (up or down) scores if other discrepancies with the grading rubric are found. After leaving the classroom, you may still ask questions (and expect reasonable responses from me), but I won't change the recorded grade.

COURSE EXPECTATIONS

To gain the most from this class, you would:

- participate in in-class discussions (at least within your small neighbor group)
- try hard on all assigned exercises
- try additional exercises when you don't yet feel comfortable with the material
- ask questions during class (and of course always attend class)
- come to office hours to ask questions
- start the assignments early to realize what you don't understand in time to come to office hours to ask questions
- ask questions of your classmates, including through the Blackboard discussion board
- deepen your understanding by attempting to answer your classmates' questions
- read the material before lecture if it's helpful, or don't if it's not
- use your MU account and put "4371: " or "7371: " at the beginning of the Subject for any email you send me

Regarding the debated existence of "dumb questions": I personally find some questions to be smarter than others (having asked my share of "dumb" questions over the years), but you can expect me to treat you with the same level of respect regardless of your question's content. I highly value all honest questions.

During class, usually some of the time I will present and explicate material. The content will usually overlap with the textbook, though the intuitive arguments/pictures/etc. may sometimes differ. We will also sometimes break into smaller groups to discuss questions, before discussing as a large group together. At any time during class, you are welcome to raise your hand and ask a question. You may find that reading the textbook before class lets you better formulate questions during class, but this is not required.

You can expect me to:

- plan the course, and alter the plan as needed. I welcome your real-time feedback, and I will consider it seriously even if I ultimately disagree. One of the keys to learning (according to current views of research into learning) is having an appropriate level of challenge—not too much, not too little.
- provide you with ample opportunity to practice your new skills and understanding—another key to learning. Imagine training for a marathon by listening to lectures on running form and reading books about optimal training routines without ever actually running/exercising—just as foolish to have training in econometrics without any exercise sets.
- give you feedback. Yet another key to learning is receiving timely, targeted feedback, which is why we have a number of exercise sets (that should be returned to you in a timely manner).
- be patient when you are struggling with a new concept—this is how learning occurs, actively and not passively
- provide appropriate guidance when the struggle is overwhelming
- treat you, as adult learners, with the corresponding type and level of respect

If all goes well, by the end of the semester, you will be able to:

- recognize and define econometric terms like “conditional mean,” “panel data,” and “endogeneity”
- describe what methods like OLS do in mathematical as well as qualitative terms
- understand basic economic objects of interest in terms of mathematical descriptions
- intuitively and mathematically describe the assumptions required for certain methods to “work”
- describe what it means for a given method to “work”—or more generally, describe the properties of a method when its assumptions hold
- precisely interpret the output from running a common econometric method on a given dataset
- run some basic Stata or R commands, and feel comfortable learning more commands on your own
- think critically about whether certain mathematical assumptions are true for a particular dataset
- judge whether a given econometric method is appropriate for a given dataset and object of interest
- think about what data and what econometric method you might want in order to answer a given economic question, both ideally and practically

ACADEMIC INTEGRITY

Academic integrity is essential to our institutional values of respect, responsibility, discovery, and excellence. These values are fundamental to the everyday function of our academic community, as well as to the goals and vision we have for the University of Missouri. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

Each member of our community—faculty, staff, and students alike—must be committed to the principles of honesty and fairness. Faculty and staff are expected to model appropriate behavior and demonstrate their commitment to our community. Students also bear responsibility for upholding the culture of integrity in our community. Maintaining this culture, and our institutional values, requires that students do not tolerate the actions of those community members who engage in inappropriate behavior.

Academic integrity ensures that all students have a fair and equal opportunity to succeed. Any behavior that provides an unfair advantage to one student is unacceptable and will not be tolerated. Each piece of work completed by a student must be solely a reflection of that student's own work or his or her contribution to a collaborative effort.

ACADEMIC INTEGRITY PLEDGE: "I strive to uphold the University values of respect, responsibility, discovery, and excellence. On my honor, I pledge that I have neither given nor received unauthorized assistance on this work." Students are expected to adhere to this pledge on all graded work whether or not they are explicitly asked in advance to do so.

The University has specific academic dishonesty administrative procedures. Although policy states that cases of academic dishonesty must be reported to the Office of the Provost for possible action, the instructor may assign a failing grade for the assignment or a failing grade for the course, or may adjust the grade as deemed appropriate. The instructor also may require the student to repeat the assignment or to perform additional assignments. In instances where academic integrity is in question, faculty, staff and students should refer to Article VI of the Faculty Handbook. Article VI is also available in the M-Book. Article VI provides further information regarding the process by which violations are handled and sets forth a standard of excellence in our community.

ACCOMMODATION OF DISABILITIES

Students with Disabilities:

If you anticipate barriers related to the format or requirements of this course, if you have emergency medical information to share with me, or if you need to make arrangements in case the building must be evacuated, please let me know as soon as possible.

If disability-related accommodations are necessary (for example, a note taker, extended time on exams, captioning), please register with the Office of Disability Services, S5 Memorial Union, 882-4696,

<http://disabilityservices.missouri.edu>, and then notify me of your eligibility for reasonable accommodations. For other MU resources for students with disabilities, click on “Disability Resources” on the MU homepage.

INTELLECTUAL PLURALISM

The University community welcomes intellectual diversity and respects student rights. Students who have questions or concerns regarding the atmosphere in this class (including respect for diverse opinions) may contact the Departmental Chair or Divisional Director; the Director of the Office of Students Rights and Responsibilities (<http://osrr.missouri.edu>); or the MU Equity Office (<http://equity.missouri.edu>), or by email at equity@missouri.edu. All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.

ACADEMIC INQUIRY, COURSE DISCUSSION, AND PRIVACY

University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in Section 200.015 of the Collected Rules and Regulations. In this class, students may make audio or video recordings of course activity unless specifically prohibited by the faculty member. However, the redistribution of audio or video recordings of statements or comments from the course to individuals who are not students in the course is prohibited without the express permission of the faculty member and of any students who are recorded. Students found to have violated this policy are subject to discipline in accordance with provisions of Section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.

NOTICE OF NONDISCRIMINATION

The University of Missouri System is an Equal Opportunity/ Affirmative Action institution and is nondiscriminatory relative to race, religion, color, national origin, sex, sexual orientation, age, disability or status as a Vietnam-era veteran. Any person having inquiries concerning the University of Missouri–Columbia’s compliance with implementing Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Americans With Disabilities Act of 1990, or other civil rights laws should contact the Assistant Vice Chancellor, Human Resource Services, University of Missouri–Columbia, 130 Heinkel Building, Columbia, MO 65211, (573) 882-4256, or the Assistant Secretary for Civil Rights, U.S. Department of Education.

GRIEVANCE POLICY

Information concerning student grade appeal procedures and non-academic grievances and appeals may be found in the Student Handbook.

INTELLECTUAL PROPERTY NOTICE

All course materials including but not limited to the syllabus, course assignments, study guides, learning guides, online lecture videos and content, and lab book (i.e., course pack) are property of the instructor and University and may not be shared online or distributed in any manner to others. Students are prohibited from posting course materials or notes online and from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course. Doing so will constitute both an academic integrity violation and a copyright violation. Violations of copyright laws could subject you to civil penalties and criminal liability. Violations of academic integrity may subject you to disciplinary action under University policies.