ECON 8331 — ECONOMETRICS II, 2024

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Hours: You can contact me any time (except Mo and We morning because I teach) with short questions and you can email me for longer meetings [the email inbox helps me get it into the calendar so I don't mess up] or to set up Zoom/Team meetings.
TA: The TA is Hanieh Nasrollahi (haniehnasrollahi1996@gmail.com)

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Required Language for All Courses
Mental Health and Wellness Resources:
The University of Houston has a number of resources to support students mental health and overall wellness, including CoogsCARE and the UH Go App. UH Counseling and Psychological Services (CAPS) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit uh.edu/caps, call 713-743-5454, or visit a Lets Talk location in-person or virtually. Lets Talk are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed. Need Support Now? If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text 988, or chat 988lifeline.org.
Title IX/Sexual Misconduct
Per the UHS Sexual Misconduct Policy, your instructor is a responsible employee for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/. Reasonable Academic Adjustments/Auxiliary Aids The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: https://uh.edu/accessibility/ calling (713) 743-5400, or emailing jdcenter@Central.UH.EDU. The Student Health Center offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment. The A.D. Bruce Religion Center offers spir-

itual support and a variety of programs centered on well-being. The Center for Student Advocacy and Community (CSAC) is where you can go if you need help but dont know where to start. CSAC is a home away from home and serves as a resource hub to help you get the resources needed to support academic and personal success. Through our Cougar Cupboard, all students can get up to 30 lbs of FREE groceries a week. Additionally, we provide 1:1 appointments to get you connected to on- and off-campus resources related to essential needs, safety and advocacy, and more. The Cougar Closet is a registered student organization advised by our office and offers free clothes to students so that all Coogs can feel good in their fit. We also host a series of cultural and community-based events that fosters social connection and helps the cougar community come closer together. Visit the CSAC homepage or follow us on Instagram: @uh_CSAC and @uhcupbrd. YOU belong here.

Women and Gender Resource Center
The mission of the WGRC is to advance the University of Houston and promote the success of all students, faculty, and staff through educating, empowering, and supporting the UH community. The WGRC suite is open to you. Stop by the office for a study space, to take a break, grab a snack, or check out one of the WGRC programs or resources. Stop by Student Center South room B12 (Basement floor near Starbucks and down the hall from Creation Station) from 9 am to 5 pm Monday through Friday.

Academic Honesty Policy
High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The UH Academic Honesty Policy is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Excused Absence Policy
Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability. Recording of Class Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that

you need to record class-related activities, please contact the Justin Dart, Jr. Student Accessibility Center. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructors recordings for their own studying and notetaking. Instructors recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.
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Learning Outcomes:

- Students will learn, through lectures, homeworks, and TA-sessions, to master econometric tools at a level that, in conjunction with other core-classes, enables the students to perform statistical analysis of economic models.
- Students will develop their technical skills as a background for doing empirical work to the level expected in graduate economics programs. For this purpose, student will learn to use the econometric software to estimate models on actual economic data.
- Students will learn the basic ideas of advanced econometrics with a focus on empirically relevant issues.

Course Description

The topics you should know for the exam is what is taught in class. It is usually not helpful to read further material, but it is often very helpful to read an alternative presentation of the same material. The class is less coherent than Econometrics I because some of the important topics have not yet found their final form yet in the literature. ("Importance" means that if you do empirical work, you are expected to know this stuff.)

Readings:

Posted on class website. May be updated during the semester.

Textbooks:

I use notes. Everything you are expected to know is posted on the webpage. In places, I somewhat follow Davidson and MacKinnon: "Econometric Theory and Methods" Oxford University Press 2004, but I do not follow the book exactly and you are expected to know what I teach, not what is in the book. One of the reasons that I don't always follow the book, apart from some idiosyncracies of D&M, is that they often do too many side-bars, while I try to teach exactly what you have to know (so do not focus on the book, unless you want alternative coverage, you will get sidetracked). Occasionally, some material is better covered in Greene than in Davidson-MacKinnon or you might prefer Greene. (When I read Greene, I tend to get distracted by the too-many examples, but fell free to like Greene better.) Bruce Hansen's text is excellent. However, let me stress that I do not assume that you have read any of those books and it will not help you to read stuff in those books that I did not cover. I will post notes of my own and some supplementary papers or links. Some of

the material covered (clustering, weak instruments) are extremely important in empirical work, but does not yet have a clear treatment in textbooks, so we have to gather the material from several sources. This makes a less smooth and coherent package, but this is what you will encounter in your own research and in seminars. I have no current plans of updating the material from last year, so look at last years WEB-page to see what was covered. (If new surveys come out in recent material, I may switch to those. We may also adjust on the margin what is covered.)

Note: Some of the material may seem hard. In econometrics II, I cannot make it even. The class covers "what every applied economist should now" (and far from all of it), so we have to take it as the material is currently developed. If you make sure you understand all the Matlab exercises, you will be in good shape going forward. (In order to use a method, you need not be able to prove why it works, but you have to able to interpret it. However, the more you understand, the less likely you are to mis-use a method, so we will do a lot of derivations.)

Notes, homeworks, information, etc. will be posted on the class webpage. The class webpage will be accessible from my home page as are previous years' if you want more old exams to solve.
Material covered: Some of the material is covered in Econometrics I or Statistics. But in the past, almost all students benefitted from having it covered again in more depth with computer homeworks. Econometrics is constantly evolving and some of the material in class may change from last semester or we may cover some hot fields and shorten others (you still should take macroeconometrics and/or microeconometrics to get to the frontier).

- Maximum Likelihood
- Information matrix and estimation of the variance of the parameters.
- You should be able to find the score, Hessian, ML-estimator, etc. for any (simple) model but, in particular, well known ones such as:
  - Normal with regressors
  - Normal autoregressive
  - Normal moving average
  - Exponential
  - Bernoulli
  - Logit and Probit Models (univariate in detail, multivariate less detailed).
  - The Poisson Model. (If we have time.)
- Testing. Likelihood Ratio, Wald, and ML tests. (In detail for the ML case.)
- The Newton Algorithm. (Theory or practical examples.)

- Panel data. Fixed effects and Frisch-Waugh application to fixed effects (be aware that demeaning to remove more than one fixed effect is not correct in unbalanced panels). Bias of order $\frac{1}{T}$ in short dynamic panels in the absence of strict exogeneity.
- Selectivity: ML and and Heckman correction (inverse Mill's ratio).
- Duration models, briefly.
- Systems of equations. SURE (including VAR), 2SLS, and (briefly) 3SLS. Make sure you can derive the results that SURE estimators are identical to equation-by-equation OLS when the regressors are identical using Kronecker products.
- Clustering of standard errors. Know the basic formula and know the broad conclusions of the papers by Moulton and Bertrand, Dufflo, and Mullainathan.
- Bootstrapping standard errors: simplest case. The parametric bootstrap.
- Weak Instruments. Know the Monte Carlo example of Nelson and Startz and the empirical issues with the Angrist-Krueger paper (or "Does compulsory school affect..". QJE 1991) . Know the Stock et al. rule of thumb for first stage F-tests. Be ready to repeat the derivation on pp. 326-327 in the Davidson-MacKinnon book. New paper by Moreira.
- GMM estimation. The general setup of minimization problem. Wald testing, the J-test for overidentifying restrictions, the Likelihood Ratio type test (when is it valid?).
- Non-parametric variance estimation. What is the Newey-West (Bartlett) kernel and how is it used. What is a "bandwidth?"

These are potential topics that we likely will not get to (maybe one of them).

- Structural VARs. Be able to find the impulse response function and variance decomposition (theoretical or in a simple application, like a two-variable AR(1) or AR(2) process) and explain how people identify the model by triangularizing the variance matrix and "ordering" the data).
- Unit Roots. Superconsistency. Direction of bias if the data is a random walk and we estimate an AR(1). The Augmented Dickey-Fuller test. Make sure about what regression we typically run to test for a unit root with drift against a stationary model with trend, and what is the null hypothesis tested.
- Be able to demonstrate the issue of Local Average Treatment Effect using the simple example in my Quantitative Economics article.