

ECON 8331 — ECONOMETRICS II, 2021

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**Hours:** You can contact me any time with short questions and you can email me to set up Zoom/Team meetings.

**University Required Notes:**

Recent Policy Changes

End of the Interim Grade Policy Starting with the Summer 2021 semester, courses return to the standard grading policy.

The Interim Grade Policy is no longer in effect.

Excused Absence Policy please review the recently passed Excused Absence Policy, which is a permanent rather than interim policy:

<https://uh.edu/provost/policies-resources/student/excused-absence-policy/>

You can find more information on UH Grade Policy here:

<http://publications.uh.edu/content.php?catoid=36&navoid=12929>

Important Dates

Monday, August 30th: Last day to add a class for regular session courses.

Wednesday, September 8th: Official Reporting Day (ORD), the last day to drop a course without a grade.

Tuesday, November 4th: Last day to drop a class or withdraw with a W.

Students with Disabilities:

The College of Liberal Arts and Social Sciences, per 504/ADA guidelines, is committed to providing reasonable academic accommodations to students who request them. Students seeking accommodation must register with the Justin Dart, Jr., Student Accessibility Center at 713-743-5400 and present approved documentation as soon as possible. For more information, see the website: <https://uh.edu/accessibility/>

Academic Honesty: To cultivate an environment of academic integrity, the University of Houston expects students to abide by the University's

Undergraduate Academic Honesty Policy,  
found in the Undergraduate Catalog. <http://www.uh.edu/academic-honesty-undergraduate>

Counseling and Psychological Services:

Counseling and Psychological Services (CAPS) ---[www.uh.edu/caps](http://www.uh.edu/caps)---are available for students having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS) by calling 713-743-5454 during and after business hours for routine appointments or if you or somebody you know is in crisis.

The Lets Talk program provides a drop-in consultation service at convenient locations and hours around campus.

<https://uh.edu/caps/outreach/lets-talk/index.php#hours>

Excused Absence Policy:

For details on the UH Undergraduate Excused Absence Policy, please review the following guidelines for both planned and unplanned absences:

<https://uh.edu/provost/policies-resources/student/excused-absence-policy/>

Student Conduct Policy:

CLASS students are expected to abide by the University of Houston's Code of Student Conduct:

<http://www.uh.edu/dos/behavior-conduct/student-code-of-conduct/>

Sexual Misconduct Policy:

In accordance with 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 on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>.

## 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. In places, I follow Davidson and MacKinnon: “Econometric Theory and Methods” Oxford University Press 2004. For most topics, 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 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 (which I think Nathan Caner uses some for Econometrics I) is good also. I will post some supplementary papers or links and some notes of my own. 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. 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 not even 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 be 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 WEB-page will be accessible from my home page.

**Material covered:** (Some of the material, in particular Maximum Likelihood, is covered in Econometrics I. But in the past, almost all students clearly needed it covered again.)

- 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
  - Testing. Likelihood Ratio, Wald, and ML tests. (In detail for the ML case.)
  - The Newton Algorithm. (Theory or practical examples.)
  - Logit and Probit Models (univariate in detail, multivariate less detailed).
  - The Poisson Model. Likelihood.
- 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 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.
- 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.