

Syllabus
ECON 6310: Econometrics I
SPRING 2018

Instructor/Office Hours

Jungbin Hwang (jungbin.hwang@uconn.edu, OAK 333, Office hour: TBA)

Time and Location

Tu/Th 12:30pm ~ 1:45pm / OAK 104

Description of the Course

The course will be centered around probability and statistical theories that underpin econometric methods and properties of classical linear regression and some backgrounds for large sample analysis in econometrics model.

Main Textbook

- *Probability, Statistics and Econometrics* - 1st Edition - Elsevier by Oliver Linton

Other References

- *A Probability Path*. Basel: Birkhäuser by Resnick SI (1999)
- *Introduction to Mathematical Statistics (7th Edition) 7th Edition* by Robert V. Hogg, Joseph W. McKean, Allen Craig
- *Asymptotic Theory for Econometricians*: Revised Edition by H. White.

Web Page

The course materials will be posted on HuskyCT, including all the class notes. Throughout the semester I will make announcements through the mail function in HuskyCT.

Grading

- Midterm Exam: (40% of Final Grade): **March 6th (12:30pm ~ 1:45pm / OAK 104)**
- Final Exam: (60% of Final Grade): Exam will be open book and notes.

Outlines

1. Basic Probability Theory (Week 1~1.5, Ch.1 ~ 3 in Linton)
 - (a) Set theory, Basics of probability
 - (b) Conditional probability and independence
 - (c) Random variables, Distribution functions
 - (d) Density and mass functions
2. Expectations and Transformations (Week 1.5~2.5, Ch.4 ~ 5 in Linton)
 - (a) Expected values, Moment and moment generating functions
 - (b) Characteristic functions

3. Multiple Random Variables (Week 2.5~4, Ch. 6 ~ 7 in Linton)
 - (a) Joint and marginal distributions
 - (b) Conditional distributions and independence
 - (c) Covariance and correlation

4. **Application: Recovering Treatment Effect under Unconfoundedness** (Week 4~5.5)

Reading articles

 - “*Conditional independence in statistical theory (with discussion)*”. by Dawid, A. P. (1979). J. R. Statist. Soc. B 41, 1-31.
 - “*The central role of the propensity score in observational studies for causal effects*” by PR Rosenbaum, DB Rubin - *Biometrika*
 - Ch. 1-3, 5.1, 5.4, 5.11 in “*Recent Developments in the Econometrics of Program Evaluation*” by Guido W. Imbens and Jeffrey M. Wooldridge, *Journal of Economic Literature*, Vol. 47, No. 1 (Mar., 2009), pp. 5-86

5. Asymptotic Theory Properties of a Random Sample (Week 5.5~7.5, Ch. 8, 10 in Linton)
 - (a) Some Useful Inequalities
 - (b) The sample mean and variance
 - (c) Sampling from the normal distribution
 - (d) Convergence concepts

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6. Estimation/Hypothesis Tests/Confidence Intervals (Week 7.5~9.5, Ch. 11 ~ 13 in Linton)
 - (a) Method of moments, Maximum likelihood
 - (b) Evaluating estimators
 - (c) Hypothesis Tests
 - (d) Confidence intervals

7. The classical linear regression model (Week 9.5~12, Ch. 16 ~ 18 in Linton)
 - (a) Review of linear algebra
 - (b) Algebra of least squares
 - (c) Classical linear regression model

8. Asymptotic distribution theory and its application to linear regression model (Week 12~14, Ch. 19 ~ 20, 22 in Linton)
 - (a) Large sample analysis of OLS
 - (b) Heteroskedasticity and serial correlation

Final Exam (TBA)

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