YILDIZ TECHNICAL UNIVERSITY
DEPARTMENT of ECONOMICS

ECONOMETRICS I
(Group 1, Wednesday 10.00-12.50)

Syllabus

Instructor: Prof. Dr. Hüseyin Taştan
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Classnotes: http://avesis.yildiz.edu.tr/tastan/dokumanlar
        https://github.com/htastan/Econometrics-I
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Office Hours (On-line): By appointment (please send an email)
Course assistant: Hakan Yıldız

SCOPE and PURPOSE

The purpose of this course is to teach fundamental methods of analysis in econometrics at an undergraduate level. Econometrics basically deals with developing statistical methods for estimating and testing economic relationships and theories. This is reflected in the following definition of econometrics: "*Econometrics may be defined as the social science in which the tools of economic theory, mathematics, and statistical inference are applied to the analysis of economic phenomena*" (A. Goldberger). Econometrics focuses on the analysis of nonexperimental economic data. Although some social experiments can be devised it is usually impossible to conduct economic experiments. Unlike statistical methods employed in natural sciences, econometrics develops special methods to handle nonexperimental economic data.
Econometrics software: We will use R in class and in lab sessions. R is an open-source software for statistical computing and graphics which is widely used by statisticians, researchers, data scientists and econometricians as well as industry professionals. The latest version of R can be downloaded from:
https://www.r-project.org/
And R-studio may be used as an integrated development environment for R:
https://www.rstudio.com/products/RStudio/

PREREQUISITES
- Statistics I-II (you need to pass both); also basic knowledge of algebra and calculus at the college level (Maths I-II) but passing is not required.

TEXTBOOK
- J.M. Wooldridge (**W**), *Introductory Econometrics: A Modern Approach*, 6th ed., 2016, Cengage Learning.
  R applications based on the Wooldridge's text:
- F. Heiss (**H**), *Using R for Introductory Econometrics*, 2016, CreateSpace.
  Online version and other materials available at: http://www.urfie.net/

ADDITIONAL MATERIALS
- Class notes
- J. H. Stock and M.W. Watson (**SW**), *Introduction to Econometrics*, 3rd ed., 2015, Pearson.

EVALUATION

Midterms: 60% (there will be two midterms, 30% each)
Final: 40%

Dates for the midterm exams will be determined by the faculty administration. Estimated date for the first midterm is around 8th or 9th week, second midterm is around 12th week. Final exam will be held within two weeks following the last day of classes.

CLASS SCHEDULE

Week	Topics (W: Wooldridge, H: Heiss, SW: Stock and Watson)	Preparation
1 (Oct. 7)	Introduction to Econometrics: Definition, scope and purpose of econometrics, Types of economic data, Causality and the notion of ceteris paribus, Review of concepts in statistics and mathematics. Lab: introduction to R and RStudio, objects in R, vectors and matrices, data frames, summary statistics, graphics	W: ch. 1 SW: ch. 1-2-3 H: ch. 1
2 (Oct. 14)	Simple (Bivariate) Regression Model I: Estimation problem, Ordinary Least Squares (OLS) Estimation, Algebra of OLS Lab: Handling data in R, bivariate regression analysis using R	W: ch. 2 SW: ch. 4 H: ch. 2
3 (Oct. 21)	Simple (Bivariate) Regression Model II: Incorporating nonlinearities, Finite Sample Properties of OLS estimators: Unbiasedness, Efficiency, variance of OLS estimators, t-test, confidence interval Lab: bivariate regression analysis using R	W: ch. 2 SW: ch. 4-5 H: ch.2
4 (Oct. 28)	Multiple Linear Regression Model I: Estimation, Assumptions of the classical model, Gauss-Markov Theorem Lab: multiple regression analysis using R	W: ch. 3 SW: ch. 6 H: ch. 3
5 (Nov. 4)	Multiple Linear Regression Model II: Statistical Inference, Hypothesis Tests, t-test Lab: conducting tests in multiple regression analysis using R	W: ch. 4 SW: ch.7 H: ch. 4
6 (Nov. 11)	Multiple Linear Regression Model III: testing multiple linear restrictions, F-test, Lagrange Multiplier (LM) test Lab: hypothesis tests in regression analysis using R	W: ch. 4 H: ch. 4
7 (Nov. 18)	Asymptotic properties of OLS estimators, Consistency and asymptotic normality Lab: R applications and solutions to selected problems	W: ch. 5 H: ch. 5
8	Midterm I (exact date and time to be announced later)	
9 (Dec. 2)	Functional form in the multiple regression model, quadratic terms in the regression, interaction terms, goodness-of-fit measures, prediction Lab: R applications and exercises	W: ch. 6 H: ch. 6
10 (Dec. 9)	Incorporating qualitative information in the model: Dummy (binary) variables in regression models Lab: R applications and exercises	W: ch. 7 H: ch. 7
11 (Dec. 16)	Binary dependent variables: linear probability model (LPM), Logit model Lab: R applications and solutions to selected problems	W: ch. 7 H: ch. 7
12	Midterm II (exact date and time to be announced later)	
13 (Dec. 30)	Heteroscedasticity Lab: R applications	W: ch. 8 H: ch. 8
14 (Jan. 6)	Misspecification and data problems Lab: R applications and solutions to selected problems	W: ch. 9 H: ch. 9