Econometrics B
Econ 120B, Spring 2018

Course description: As a follow-up to the course Econ 120A, this course provides an introduction to the regression analysis frequently used in economics, business, and many other areas. It deals with applications of statistical methods for testing and estimation of causal relationships can be inferred from data. The material can be challenging and the workload is substantial. However, the payoff for this course is a set of skills and analytical tools that are very useful and in high demand in the marketplace.

Learning objectives:

1. The goal is to learn enough theory and get enough practice to be able to do some simple but sensible regression analysis on your own.
2. The students should obtain the skills for basic regression analysis with real economic data.
3. The students will develop a working knowledge of Stata, an econometric software package.

Prerequisites: Econ 120CA or ECE 109 or Math 180A or Math 183 or Math 186.

Course materials:

- Required textbook: James H. Stock and Mark W. Watson, *Introduction to Econometrics*, 2nd Edition, Pearson. You can use other editions of the textbook if you wish, but the problem set will refer to the 2nd edition.
- Required Statistical Software: Stata
  Our school has a site license for Stata/SE 15. You can download and install Stata in your computer freely. I have posted STATA installation steps on TritonED under Software Organization link which requires student to enroll their account once and have access to all site licensed software tools, attached the installation steps.

Lectures: Tu/Th 11:00am – 12:20pm @ Solis Hall 107

Instructor: Dr. Munpyung O

- Office: Economics 109
- Office hours: Tuesday 1:30 – 2:30 and Thursday 9:30 – 10:30 and by appointment.
- e-mail: munpyung@ucsd.edu

  Please use your **ucsd email** and include "**Econ 120B**" in the subject line of your email. The professors and TA will respond to **thoughtful** emails. We cannot answer all the questions through emails since some econometrics questions are hard to answer through emails.

Discussion section: 6:00 – 6:50 and 7:00 – 7:50 on Wednesdays @ Center Hall 113

Teaching Assistants: Spini, Pietro, SH 226, pspini@ucsd.edu

Undergraduate TA (UIA):

- Fan, Xueyuan, xuf005@ucsd.edu
- Yang, Zixu, ziy045@ucsd.edu

Lectures and Discussion Sections: It is important to come to every lecture. If you should miss a class, it is your responsibility to get the notes and any information provided in class. There are weekly discussion sections for this course. You are **strongly** recommended to attend them since the TA will review material covered in class, and also introduce material not covered in class and go over practice problems, the kind of problems you may encounter on exams. You will also be able to ask the TA any question about the material covered in the lectures during these discussion sections.

Problem Solving and Economics Tutoring (PSET) Center: The Economics Department has made a problem solving and tutoring center available to all students in Econometrics (120ABC) on M-Th evenings and on Sunday. The ability to apply the concepts from class to solve problems is the most important skill we want you master in our core classes. PSET is designed to help you learn to tackle problems successfully by having grad and undergrad TAs there to help you think through a problem - right when you get stuck. If you struggle to tackle your homework, we believe that PSET will be an efficient and effective way for you to learn how to think like an economist.

PSET schedule: From week 2 to week 10

- Monday - Thursday: 5:30pm - 8:30pm @ Econ 300
- Sunday: 4:00pm - 8:00pm @ Econ 300

Course web page: A course webpage is available at `http://tritoned.ucsd.edu`. It will include information relevant to the course, such as syllabus, problem sets, data sets and more. **You should check this page regularly**.

Lecture slides: I have created my lecture slides for my own use not for distribution. These are very far from a complete record of what I say in class. By themselves they will be insufficient for keeping up with the course. Rather, the slides will serve as an outline for developing the concepts in each lecture while still requiring active learning (attending lectures, taking notes, and asking questions).

- I will post my lecture slides AFTER finishing a chapter or a topic.
- It is not completed or polished and cannot be a substitute for my lectures. These are just lecture slides and undoubtedly contain errors. Many details, derivations, and examples are left out.
- A nontrivial fraction of the exam questions could be based on class discussion and examples which are uncovered in the lecture slides.

- The slides are a cut-down version of the full lecture and won't contain all the details that the live version possesses. Again, the lecture slides cannot be a substitute for my lecture. **Without attending lecture, you will not understand my lecture slides**.

Problem Sets: I will periodically assign problem sets throughout the course. Even though they will not be collected or graded, it is VERY important to do them. The problem sets are the best way to learn and be prepared for the exams.

Exams: The midterm will be given in regular class, Thursday, May 10. The final will be given 11:30am - 2:30pm on Tuesday, June 12. The dates for the exams are not negotiable. If you have a conflict with the scheduled tests, it is your responsibility to drop the course. The final exam will be cumulative, but focus more on the material covered after the midterms. All tests are closed book and notes.

Quizzes: We will have four unannounced (pop-up) quizzes during lectures and TA discussion sessions. We will drop the worst score out of four quizzes. There will be no make-up quizzes.

Makeup exams: Make-up examinations will be given only under very unusual circumstances and only if the student provides official written notification to the instructor no less than two weeks prior to the missed test. If you miss a midterm for a **justifiable** and **verifiable** reason, your midterm grade will be your grade on the final. Students who miss a test without a justifiable and verifiable reason, will most likely fail the course. No exception!

Grades: The overall score will be computed as follows:

- In class or TA section quizzes: 15%
- Midterm: 35%
- A comprehensive final: 50%

The overall course grade, computed using the weights specified above, will be curved.

I reserve the right to modify these weights as needed during the quarter.

Disability: If you have a documented disability, please bring your documentation to me as soon as possible so that I can make suitable accommodations for you. If you believe that you have a disability and desire accommodation, please register with the Office for Students with Disabilities.

Class conduct: Each student is expected to contribute and help to maintain a positive classroom environment conducive to learning. Do not socialize or read newspapers during class, and be sure your cell phones are turned off. No text messaging is allowed. If you must arrive late or leave early, do so quietly.

Academic Integrity: Any student found responsible for violating UCSD's academic integrity policy will earn a failing grade for the course. In addition, the Council of Deans of Student Affairs will impose a disciplinary penalty. You can find information on the university's policy on academic integrity at this website: https://students.ucsd.edu/academics/academic-integrity/policy.html

General comments

- Even if I don't explicitly assign reading from the text, it is a good idea to read the chapter before coming to class in order to have some understanding of the concepts to be presented.
- ***This class moves rapidly***. *Cramming* is not an effective way to learn this material. A student who keeps up with the topics as they presented will find the course much more enjoyable and will master the concepts more quickly.
- **Attend all lectures**. You are responsible for any information given during lectures.
- Please do use my office hours for everything related to the content of the course. If you have doubts about the materials, do not wait until a few hours before the exam.
- Students are encouraged to ask questions in class. You've probably heard this before, but if you have a question, chances are that others in the class have the same question.
- Finally, ask questions before, during, or after class or come to my office if you having any trouble with the course material. Remember the goal of education is to learn, not to suffer!

Course content and schedule (Changes, if any, will be announced in the class.)

The following course schedule should be considered extremely tentative, and will likely change depending on our pace through the quarter. I reserve the right to modify this schedule as needed during the quarter.

0. Introduction and a brief review of Econ 120A (Chapter 1 - 3)
   - Random variable and its characterization
   - Sampling distribution, sample statistics: Standard deviation and Standard error
   - Covariance, correlation, regression, causality, the notion of Ceteris Paribus
   * Causal effects from the observational and experimental data

1. Simple Regression (One regressor): Estimation (Chapter 4)
   - Estimation, good estimation (BLUE)
   - OLS, MOM, (MLE - without calculus, intuition only)
   * Geometry of Regression: Conditional expectations, projection
   - Statistical and economic interpretation estimated coefficients
   - Measure of fit: SER and R-squared

2. Simple Regression (One regressor): Inferences (Chapter 5 and part of Chapter 8.2)
   - OLS Assumptions
   - Sampling distribution of the OLS estimators
   - Confidence intervals, Testing statistical significance of a single parameter: t- test
   - Heteroskedasticity and Homoskedasticity
   - Data scaling: Unit of measurement and log variables in regression
   * ANOVA basics

3. Multiple Regression: Estimation (Chapter 6)

   - OVB (Omitted variable bias)
   - Statistical and economic interpretation estimated coefficients: Partial effect
   - Measure of fit: Adjusted R-squared
   - OLS Assumptions for multiple regression: multicollinearity

4. Multiple Regression: Inferences (Chapter 7)

   - Sampling distribution of the OLS estimators
   - Efficiency of OLS: The Gauss-Markov theorem
   - Confidence intervals, one sided t-test
   - Testing statistical significance of a group of parameters: F-test

5. Topics in Multivariate Regression (Chapter 8)

   - Regression with qualitative independent variables: Dummy variables
   - Modeling nonlinear functions: Polynomial regression, Interaction terms

I reserve the right to add and/or subtract topics as the course progresses. Not all topics will be covered in the same detail. Time constraints may cause some topics to be omitted.