Economics 120B
Econometrics, Winter 2016
Prof. Dahl, UC San Diego

Description: This course aims to prepare students for practical empirical research in an academic or business setting. It covers the fundamentals of regression analysis, including estimation and hypothesis testing in a multivariate framework. The course also briefly covers advanced concepts such as consistency and omitted variable bias. An emphasis will be placed on determining when causal relationships can be inferred from data.

The material can be difficult and the workload substantial, particularly for people who find math courses challenging. However, your payoff for all this work is a set of skills and analytical tools that are extremely useful and in high demand in the marketplace.

Times: Tuesdays and Thursdays, 8:00 – 9:20 am, CENTR 101
Tuesdays and Thursdays, 9:30 – 10:50 am, CENTR 101

Instructor: Gordon Dahl
office hours: Thursdays, 11:00 am – 12:20 pm, ECON 324
email: eco120b@gmail.com *(email is the preferred contact method)*

TAs: The TAs are a valuable resource, and I encourage you to take advantage of their help during office hours. Office hours are listed on TritonED on the Content page. We have set up office hours for a variety of times and days so that students can receive the help they need. You can ask for help from any of the TAs, but if you have a general question, please use the class email eco120b@gmail.com.

Class Email Manager: Diego Vera is the class email manager. Please use the class email, eco120b@gmail.com, for all questions related to the class, except for Stata questions. Diego will consult with me and forward emails as necessary.

Stata Lab Head TA: Claudio Labanca is the head TA for the Stata lab. He manages a separate set of undergraduate TAs who work in the Stata lab; any of these TAs will be happy to help you with Stata and the empirical problem sets. Their office hours are listed on TritonED on the Content page. Please use the Stata lab email, statalab.ucsd@gmail.com, for any questions related to Stata and the empirical problem sets.

Review Sessions:
Fridays 3:00 – 3:50 pm, PCYNH 106
Fridays 4:00 – 4:50 pm, PCYNH 106
Mondays 6:00 – 6:50 pm, YORK 2622
Mondays 7:00 – 7:50 pm, YORK 2622

You may attend any of the four review sessions, regardless of which class you are registered for. The review sessions aim to cover the same information, so you do not need to attend more than one. The Friday sessions and the Monday sessions three days later cover the same information. The review sessions will normally focus on helping students get started on the analytical problem sets.

Stata Tutorials:

Tutorial #1: Thursday, January 7 in class
Wednesday, January 13 (sign-up times will be posted on the class webpage)
Tutorial #2: Wednesday, February 10 and Thursday, February 11 (sign-up times will be posted)
Tutorial #3: Wednesday, February 24 and Thursday, February 25 (sign-up times will be posted)

There will be three Stata lab tutorials to help students with the empirical problem sets. The first tutorial will be held during class on Thursday, January 7. It will be helpful if you bring your laptop to class for this. If possible, set up remote virtual access in advance; see the handout posted on the webpage at Content → Empirical (Stata) Homework → Files for the Stata Tutorials → Instructions on how to get virtual access to Stata (VCL). The tutorial will still be useful even if you do not bring a laptop or set up virtual remote access in advance, so do not miss it. The Wednesday, January 13 tutorials will repeat the information in a condensed form from the Thursday, January 7 tutorial, so you do not need to sign up for this unless you need more help.

For tutorials #2 and #3 (and the Wed, Jan 13 tutorial), you will need to sign up for a small group session on TritonED on the Groups page. Details on how to sign up for tutorials and how they work will be explained on January 7.

While attendance at the tutorials is not mandatory, it is highly recommended. Past students have found these tutorials to be invaluable in completing the empirical homework assignments.

Class Website: The class website, hosted at tritoned.ucsd.edu, will contain the syllabus, classroom TA and Stata TA office hours, lecture notes, homework assignments, and miscellaneous handouts. It will also list important class announcements and due dates. It is your responsibility to check it regularly. The website will be used to complete your empirical (Stata) homework.

Text: Introduction to Econometrics, 2nd Edition, by Stock and Watson (REQUIRED)
The UCSD special edition of this textbook is a custom textbook with a cheaper price. It is softbound and has fewer colors, but is otherwise identical to the standard edition. You can use other editions of the textbook if you wish, but homework assignments will refer to the 2nd edition.
Statistics with Stata: Updated for Version 12, 8th Edition, by Hamilton (OPTIONAL)
This book will help you use the statistical software Stata, but is not required for the course.

Software: Part of the course involves learning to use a software package called Stata. You need to be able to access the software program in (a) a physical lab, (b) a virtual lab, or (c) purchase your own copy.

(a) Students have physical access to *Stata* in ECON 100, SH 142 and ERC 117.
(b) To set up remote virtual access, see the handout posted on the webpage at Content → Empirical (Stata) Homework → Files for the Stata Tutorials → Instructions on how to get virtual access to Stata (VCL).
(c) Individual copies of *Intercooled Stata* can be leased for six months for $69 from:
http://www.stata.com/order/new/edu/gradplans/student-pricing/
(Do not buy *Small Stata*, as it cannot handle large datasets.)

Homework: Homework is an integral part of this course, because the best way to learn econometrics is to do it. I will periodically assign problem sets throughout the semester. Students can work together on problem sets, although solutions must be written up and completed separately. It is a good idea to attempt the problems on your own before meeting with a group. While you can collaborate with others, any homework you turn in must represent your own work.

There are two types of homework assignments: (1) analytical problem sets, and (2) empirical problem sets.

(1) Analytical Problem Sets

The analytical problem sets generally come from the Stock and Watson textbook. There will be 5 or 6 of these problem sets throughout the quarter. These assignments will be posted on the web, and it is your responsibility to check the class webpage regularly for due dates. Analytical homework will be assigned no later than 2:00 pm on Friday each week, and a hard copy will generally be due the following Thursday at the *beginning* of class. Late problem sets will not be accepted for any reason; if you cannot attend class, you can either have a classmate turn in your homework for you, or you can turn it in to any of the TAs *before* class begins. You can turn in your homework to either class, regardless of which class you are officially enrolled in. Emailed homework will not be accepted.

The analytical problem sets will be graded on a two-point scale. A score of 1 will be given to homework which is incomplete, but has made a start towards answering some of the questions. A score of 2 will be given to homework which is clearly well-done, and has attempted to answer all of the assigned problems.

Solution keys to the homework will be posted on the class webpage. As these solutions will be comprehensive and the homework is only graded for completeness, homework will not be returned. If you want a copy of your homework, please make a copy before you turn it in.

You are allowed to miss one analytical problem set without penalty, as I will drop the lowest score before calculating this portion of your grade. The tradeoff for this benefit is that I will be strict about not accepting late analytical homework.

(2) Empirical (Stata) Problem Sets

There will be three empirical problem sets which involve analyzing data using the statistical program Stata. The assignments will be posted on the class webpage at least two weeks before they are due. The due dates for the empirical problem sets are Saturday, January 23; Saturday, February 20; and Saturday, March 12. Assignments are completed by answering questions and uploading Stata log and do files using the class webpage. These problem sets must be completed by 11 pm on the date they are due; since the webpage will not allow work on the problem set after the deadline, it is advisable to start early and leave plenty of time to complete the assignment.

The empirical problem sets will each be graded on a 100 point scale. Questions can be attempted an unlimited number of times before the deadline.

You are not allowed to miss any of the empirical problem sets, so start early. Notice that in some weeks, there may be an analytical problem set due on Thursday and an empirical problem set due on Saturday. It is therefore advisable to plan in advance so as to spread your workload out.

Tests: There will be a midterm and a final exam. The midterm will be administered during regular class time, on Thursday, February 11. The final exams for each class will take place according to the official final exam schedule. The class which runs from 8 to 9:20 am will have their final exam on Thursday, March 17 from 8 – 11 am. The class which runs from 9:30 – 10:50 am will have their final exam on Tuesday, March 15, from 8 – 11 am. Locations for the final exam have not yet been designated.

You must take both the midterm and the final exam at the time scheduled for the class you are enrolled in. If you have three or more exams on the same day, then you may take the final exam with the other class. To get approval to do this, send an email to eco120b@gmail.com at least two weeks before the final exam.

There will be no make-up exams, and any conflicts or emergencies should be approved by me in advance of the exams. In case of illness or accident at the time of the midterm – with proper documentation from a doctor or the police – the final will be weighted 80%.

Grades: The following weights will be used to determine your course grade:
Analytical homework: 10%
Empirical homework: 10%
Midterm exam: 35%
Final exam: 45%

Grading Policy: You should check to make sure that you have received credit for your analytical homework; scores will be recorded online no later than one week after the due date. If you turned in an assignment, but don't see a score, let us know within two weeks of the due date. After that point, we will throw out the homework assignments and have no way of verifying that you did the assignment so that we can give you credit.

If you think a mistake was made in grading your exam, you may ask for a regrade. You must write out your reason for a regrade and turn it and your exam in within 10 days of when the exam is first returned to the class. Include an email address on your written explanation so we can let you know the result of the regrade. If you ask for a regrade, your whole exam is subject to regrading. This may bring to light some previously unnoticed errors, and you may end up with a lower score, not higher. Note that unless your answer is fully correct, the assignment of partial credit is a matter of judgment, and we are unlikely to change your grade since we want to treat all class members fairly.

Cheating: Cheating will not be tolerated in this class. If you are caught cheating, helping someone else cheat, or plagiarizing, you will be penalized. Having notes (electronic or paper) on your person during the exam constitutes cheating, as do other forms of cheating such as looking at someone else's work during an exam. One possible penalty is a failing grade in the class.

Miscellaneous: Disabilities will be accommodated; contact the office of undergraduate student affairs in Sequoyah Hall 245. For all matters regarding dropping or adding the course, waitlists, etc., please contact the office of student affairs or use the online resources provided by the university.

If you have any further questions please feel welcome to email eco120b@gmail.com or come talk during office hours.

COURSE OUTLINE (rough guide):

1. Introduction: Why Study Econometrics?
Who needs data anyway? If you had some, what would you do with it? Econometric models, parameter estimates, prediction and the testing of economic theories. Getting good data: Experimental vs. nonexperimental data. Cross-sections, Time-Series, Panels.
Reading: Stock & Watson - Chapter #1.

2. Probability and Statistics: A quick review
Probability, random variables, the normal distribution and the central limit theorem, inference, confidence intervals and hypothesis testing. Asymptotics of the sample mean. Using *Stata*.
Reading: Chapters #2 and #3.

3. Simple Regression (one regressor)
Fitting a line through a cloud of points. Least squares, unbiased estimates, consistent estimates, confidence intervals, hypothesis testing, omitted variable bias, R^2.
Reading: Chapters #4 and #5.

4. Multiple Regression: Estimation
The second explanatory variable, interpreting coefficients, efficiency & heteroskedasticity, omitted variable bias.
Reading: Chapter #6.

5. Causal Inference and Random Assignment
Random assignment vs. omitted variable bias.
Reading: Ch #13.

6. Multiple Regression: Inference and Nonlinearity
Confidence intervals (CI) for parameters, CI for predictions, hypothesis testing, single (t) vs. multiple (F) tests. Etiquette for reporting results. Modeling nonlinear functions. Interaction terms between independent variables
Reading: Chapters #7 and #8.

7. Sources of Bias: measurement error, sample selection, simultaneity and omitted variables
Omitted Variable Bias again, Measurement Error, Fixed Effects, Sample Selection, Simultaneity.
Reading: Chapters #9 and #10.