ECON 230 Syllabus - Summer 2020

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The course syllabus is a general plan for the course; instructor announced deviations may be necessary.

Lectures:
Zoom video-conferences, 13:00 pm - 15:55 pm

Office Hours:
Email me to schedule a Zoom session, or use spare time at the end of class.

Exams:
Take home exams. There will be 2 Midterms and one Final.

Blackboard
Slides from lectures will be posted on blackboard as well of problem sets as they are assigned.

Suggested text
Newbold, Carlson, Thorne (2011), "Statistics for Business and Economics, 8th edition"

Software
I will use Python to make most of the empirical work, I will 3 lectures to cover all the necessary tools needed in the course. It may be a little overwhelming for students not familiar with programming languages but I think it will be really useful and I will try to make it simple as possible so that everyone can use it effectively.

Course description
This is an introduction to economic statistics. The goal of this course is really to prepare you for ECO 231W, Econometrics. 231W covers regression analysis and other techniques used to uncover causal relationships using data. In 230, we cover the foundations of probability and statistics. See the course outline for a list of topics.
You will need to know how to solve some simple integrals, such as $\int x^2 dx$ and $\int \exp(x) dx$, and you should understand how integrals relate to the area under a curve, which is needed to understand continuous probability distributions. The algebraic manipulations used in 230 may be more complex than those used in your previous economics courses. The first few weeks of the course don't use much algebra, but look through the examples in chapter 7 to see what we will move up to.
Exams in this course will cover similar material to homework problems, but exam questions won't necessarily be just be homework questions with different numbers. In most cases will be original questions. It's important to learn how to solve new problems using your understanding of the material. I recommend avoiding solution manuals, at least until you've attempted a problem for some time. I will like you to finish this course with some practical and valuable tools both in the labor market, or in grad school.

Course Grades

1. Exams: 2 Midterms 20% each. Final, 30%.
   - Time to deliver answers: (i) Midterm I-II 5 days. (ii) Final 3 days.
   - The best way to prepare for exams is to use Problem sets and exercises covered during lecture.
   - See Course Schedule for exam dates.

2. Problem Sets: 10%
   - I will upload 3 Problem sets, and give one week to solve those.
   - You may work in groups to solve the problem sets, and are in fact encouraged to do so, but you must write your own solution.

3. Final Project: 20%
   - Project will consist on a set of specific instructions so that you can apply the computational (i.e Python) and theoretical tools you will learn throughout the course in a real data analysis situation.
   - Project will consists on two tasks: (i) Using raw real data, process the dataset, construct and describe variables and perform basic statistic estimation and hypothesis test. (ii) Construct a unique dataset from scratch using by Scraping it from the Web, clean it and perform basic regression analysis.
   - You will need to submit the code you used and a pdf document with the results you found. The code must be run without a any error.
   - For the project you can work in groups of two, but also you can decide to work alone.

4. Submit Exams - Problem Sets - Project
   - Any material must be submitted as a single pdf document. The document must be titled following the next examples:
     - Villegas_Jose_PS1.pdf
     - Villegas_Jose_MidtermI.pdf
     - Villegas_Jose_Final.pdf
     - Villegas_Jose_Project.pdf
   - The material should be submitted to the following email address: eco230summer2020@gmail.com before 12:00 PM of the due date.
   - If the document is too heavy to upload it to an email send a compressed version (i.e zip-file). If that is not possible either, you can send it by parts using the same title as specified above but adding a _partX.pdf to the end.
   - Prepare as much as possible for any contingency when submitting material close to the due date.

Course Outline

1. Describing data I: Introduction and Graphs
    (a) Basic Definitions
    (b) Types of data: Classification of Variables
    (c) Graphs of categorical variables
    (d) Graphs for numerical variables
    (e) Graphs for time series
2. Describing data II: Numerical Description
    (a) Central tendency
    (b) Variability
    (c) Correlation
3. Probability
    (a) Events and probability
    (b) Probability algebra
    (c) Joint and marginal probability
    (d) Conditional probability and independence
    (e) Bayes Rule
4. Discrete Random Variables
    (a) PDFs and DCFs
    (b) Moments of Centrality and Variability
    (c) Bernoulli and Binomial distribution
    (d) Poisson and Hypergeometric distribution
    (e) Jointly distributed random variables
    (f) Correlation between two random variables
5. Continuous random variables
    (a) PDFs and CDFs
    (b) Normal distribution
    (c) Exponential distribution
    (d) Chi-squared distribution
6. Sampling and sampling distribution
    (a) Simple random IID sample
    (b) Sampling distribution of sample mean
    (c) Central limit theorem, simulation example
    (d) Sampling distribution of sample variance

7. Point estimators and Confidence Intervals
    (a) Point estimator definition
    (b) Unbiased efficient estimator
    (c) Confidence intervals
8. Hypothesis testing
    (a) Definition of hypothesis testing
    (b) Type I and type II error
    (c) Construction of hypothesis test for sample mean and variance
9. Introduction to Regression Analysis
    (a) Linear regression model
    (b) Least square estimator
    (c) Explanatory power of linear regression
    (d) Prediction
10. The ideal Experiment: Introduction to Causality and Identification.
    (a) Correlation and Causality.
    (b) Experiments
    (c) Natural Experiments