

TSE 5051 Quantitative Methods

NATIONAL TSING HUA UNIVERSITY

Spring 2022

Instructor: Eric S. Lin

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Time and Location: Monday 9:00-11:00 pm, Center of Innovative Incubator 2F-A9

Office Hours: By appointment

Course Webpage: Course materials will be available on the web through **eecl**ass.

Teaching Assistant: Julie Yang

You are lucky to have Julie Yang to be your TA.

Teaching Assistant Hours: TBA

TA will hold the office hours and also be available for consultation on homework.

Course Description:

TSE 5051 introduces a range of quantitative tools that are commonly used to inform public policy issues. It provides an introduction to descriptive statistics, probability theory, statistical inference, and decision analysis.

Our goal is that by the end of this course you will be able to:

1. Take a data set and a broad descriptive policy question (such as “What has happened to income distribution in Taiwan in the last 30 years?”), figure out what statistical analysis would be most appropriate to answer the question, conduct such an analysis, and present the findings in a way that is accessible to policymakers.
2. Identify real world policy situations in which the tools of probability can be used, identify which tools are most relevant, and critically consume policy analysis in which probability is used.
3. Critically consume policy studies/papers/reports in which statistical analysis is used.
4. Use the decision analysis framework as one tool to make personal and professional decisions, and to think about policy problems.

The course content is divided into four broad units: (1) Descriptive Statistics, (2) Probability, (3) Statistical Inference, and (4) Regression.

Although the aim will remain on the underlying theory, students will be given several opportunities to gain “hand on” experience with real data set through homework assignments. I would encourage students to make use of my office hours (or TA’s office hours) during the semester and not wait until the day before the exam. If you are having difficulty with concepts early on, then it is likely that your difficulties will snowball and that there will be insufficient time to deal with your puzzles close to the exams. So please make use of my office hours to sort out difficulties as they arise.

Prerequisites:

High school algebra

Suggested Textbook:

Basically, I will hand out my own lecture notes which are the summary of textbooks. You may find a similar textbook to the following:

- Moore, David S., McCabe, George P., Craig, Bruce A., 2021, *Introduction to the practice of statistics (10th Edition)*, Macmillan Learning.

Of course, there are lots of textbooks related to this course. If you have enough time, it would be also beneficial to check out some of the following references.

References:

Note that you don’t need to buy the following books. The book list is just for your reference.

- Gujarati, D. N., 2003, *Basic Econometrics*, McGraw-Hill.
It is the former textbook in this course.
- Wooldridge, J. M., 2003, *Introductory Econometrics: A modern approach*, South-Western.
It is a very popular undergraduate level textbook adopted in US. This book gives a huge amount of empirical examples and illustrates econometric concepts intuitively.
- Maddala, G. S., 2001, *Introduction to Econometrics*, 3rd edition, Wiley.
This book is well written and in general is deeper than our textbook. You could also find some fancy topics in Maddala’s book such as bootstrap, Jackknife and GMM.

- Kennedy, P. A., 1998, *A guide to Econometrics*, 4th edition, MIT Press.

This book tries to verbally explain difficult econometric ideas and avoids heavy math.

- Pindyck, R. S. and L. R. Rubinfeld, 1998, *Econometric Models and Economic Forecasts*, McGraw-Hill.

This is my econometric textbook when I was a junior. It is quite easy to read.

- Ramanathan R., 2002, *Introductory Econometrics with Applications*, 5th edition, South-Western.

This book provides a number of practical applications. It is also self-contained. In Chapter 14, the author demonstrates the various steps involved in carrying out an empirical research project.

- Johnston and DiNardo, 1997, *Econometric Methods*, 4th edition, McGraw-Hill.

If you are sort of familiar with matrix algebra, it is a nice book to build up the foundation of econometrics. It also serves the bridge to compensate the gap between undergraduate and graduate level econometrics.

Software: You are welcome to use any econometric packages such as *STATA*, *R*, or *Python*.

Grading: Several problem sets will be passed out during the semester. Although there are benefits to be obtained from working in groups I would advise against students free-riding off other students. There will be two midterms and a final. Note that overdue assignment will **NOT** be accepted unless accompanied by a medical certificate. The same is true for the exams. Your final grade will base on the following table. Note that **NO** make-up exam will be offered.

Assignments	20%
Midterm I	25%
Midterm II	25%
Final	30%.

Course Organization: [Tentative!!]

1. Data and Probability (2/14, 2/21, 3/7)
2. 2/28: no class meeting (Peace Memorial Day)
3. **March. 14: Midterm Exam I [In class]**
4. Statistics (3/21, 3/28, 4/11, 4/18)
5. 4/4: no class meeting (Children's Day)
6. **April 25: Midterm Exam II [In class]**
7. Regression analysis (5/2, 5/9, 5/16, 5/23, 5/30)
8. **June 6: Final Exam [In class]**