Syllabus
Nonparametric Econometrics
Professor SU Liangjun
Fall, 2014 (Weeks 1-6)
Time: Tuesdays, 7:00-10:15pm
Venue: SoE SR3-10

Instructor: Liangjun Su
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Office hours: Tuesdays, 3:00-5:00pm.

Course Description
This course serves a brief introduction to nonparametric econometrics which is standard in modern econometrics. During the 6-week course period, we will mainly focus on kernel-based nonparametric estimation and inference. This includes nonparametric kernel density estimation, tests associated with densities, nonparametric kernel regression, tests for correct specification of functional forms, nonparametric sieve estimation, and semiparametric estimation of single-equation models (including partially linear models, single-index models, additive models, etc.). If time permits, we will also briefly discuss nonparametric/semiparametric estimation of panel data models.

Textbook and Lecture Note
Nonparametric Econometrics: Theory and Practice (Highly recommended), by Qi Li and Jeffrey Scott Racine, Princeton University Press, 2007.
Nonparametric Econometrics (Optional), by Adrian Pagan and Aman Ullah, Cambridge University Press, 1999. This book is not just a cook book for applied people. It covers both theoretical foundations of nonparametric econometrics and empirical applications. The appendix is very helpful for you to grasp the core of the theoretical part.

My lecture note will be made available on my webpage http://www.mysmu.edu/faculty/ljsu/.

Homeworks, Projects, and Grading
There will be two individual homework assignments and a project. The project is due in about two months after the course ends (Tentative due date: November 25, 2014). Your final grade is based upon your performance on the homework and project, each with weight 50% and 50%, respectively. NO LATE HOMEWORK OR PROJECT WILL BE ACCEPTED.

Project Requirement
(1) The project can be theoretical or empirical. If you like econometric theory, you can prove something new. That will be absolutely fine. If you do empirical work, make sure that you use some nonparametric or semiparametric techniques.
(2) If you do an empirical project, you need to find your own data set. Make sure that your project is well motivated. Also, you may need to write your own code—which is essential for modern research. For whatever you do for the project, they will be counted for your grades. You need to turn in your codes if you want them to be evaluated toward your grade.
Page requirement? Usually I don’t specify that. Five to ten pages is fine if it is perfectly written. Twenty to thirty pages is also fine. What really matters is the quality of your work.

Questions or ideas? Please feel free to discuss with me any time.

**Tentative Schedule**

1. Nonparametric density estimation and testing
   
   (a) Univariate density estimation
   
   (b) Multivariate density estimation
   
   (c) Testing hypotheses about densities
   
   (d) Introduction to Matlab

2. Nonparametric regression
   
   (a) Local constant kernel estimation
   
   (b) Local linear/polynomial estimation
   
   (c) Nonparametric model specification tests

3. Nonparametric sieve estimation
   
   (a) Functional classes and sieve spaces
   
   (b) Sieve estimation of regression functions
   
   (c) General sieve extreme estimation
   
   (d) Sieve estimation of density functions

4. Semiparametric estimation of partially linear models
   
   (a) Estimation of the parametric component (Robinson, Li’s estimators)
   
   (b) Estimation of the nonparametric component
   
   (c) Andrews’ MINPIN method
   
   (d) Specification test of partially linear models

5. Semiparametric estimation of additive models
   
   (a) Backfitting algorithm
   
   (b) Marginal integration method
   
   (c) Additive partially linear models