

UNIVERSITY OF COLORADO - DEPARTMENT OF ECONOMICS
ECON 8828 - SEMINAR IN ECONOMETRICS 1 (3 CREDITS)
PROFESSOR CARLOS MARTINS-FILHO

Office. Economics Building 105

Meetings. Mondays and Wednesdays from 10:30 AM - 11:45 AM in Economics Building 5.

Office hours. Wednesdays 3:30 PM - 5:00 PM and by appointment. For appointment send an email to carlos.martins@colorado.edu.

Class URL. http://spot.colorado.edu/~martinsc/ECON_8828.html

Prerequisites. ECON 7828 (or equivalent) or consent of instructor.

Objectives. This course is designed to be an advanced introduction to several semi/nonparametric models for density, regression and associated estimation and inference procedures. Hence, our broad objectives are:

1. Have advanced knowledge of fundamental estimation and inference methods used for nonparametric statistical models. This will include a careful treatment of their asymptotic behavior.
2. Be able to program and implement the various estimators and test procedures discussed in class.

Grades. Your course grade depends on homework sets a final examination and a research project. The research project is a 10 to 15 page long research proposal. It should include an introduction that convinces the reader of the relevance of your research/contribution, a careful review of the relevant literature, and if applicable, the methodology to be used. You will present your research project in class during the last week of the semester. Your presentation will last 20 minutes followed by a 10 minute period for questions and discussion. Relevant dates are given below.

Evaluation	Points	Date
Homework sets	40	TBA in class
Project	30	due 12.14.12 by 5:00 PM
Final	30	TBA

Textbooks.

1. Li, Q. and J. S. Racine, 2007, Nonparametric Econometrics: Theory and Practice, Princeton University Press, Princeton.
2. Pagan, A. and A. Ullah, 1999, Nonparametric Econometrics, Cambridge University Press, Cambridge.
3. Tsybakov, A., 2009, Introduction to Nonparametric Estimation, Springer, New York.
4. I will distribute class notes. Read them carefully. They reflect my view of what are the most important concepts/theorems we cover in the course.

Support and Reference Books.

A. Mathematics, Probability, Statistics and Asymptotic Theory

1. Apostol, T., 1974, *Mathematical Analysis*, Addison Wesley, New York.
2. Bartle, R., 1966, *Elements of Integration*, John Wiley and Sons, New York.
3. Davidson, J., 1994, *Stochastic Limit Theory*, Oxford University Press, Oxford.
4. Grimmett, G.R. and D.R. Stirzaker, 1992, *Probability and Random Processes*, Oxford University Press, Oxford.
5. Jacod, J. and P. Protter, 2000, *Probability Essentials*, Springer, Berlin.
6. Luenberger, D., 1969, *Optimization by vector space methods*. John Wiley and Sons, New York.
7. Massopust, P., 2010, *Interpolation and Approximation with Splines and Fractals*, Oxford University Press, Oxford.
8. Royden, H., 1988, *Real Analysis*, Macmillan, New York.
9. van der Vaart, A., 1998, *Asymptotic Statistics*, Cambridge University Press, Cambridge.

B. Nonparametric Methods

1. de Boor, C., 2001, *A Practical Guide to Splines*, Springer, Berlin.
2. Eubank, R., 1999, *Nonparametric Regression and Spline Smoothing, Second Edition*, Marcel-Dekker, New York.
3. Fan, J. and I. Gijbels, 1996, *Local Polynomial Modeling and its Applications*, Chapman and Hall, London.
4. Prakasa-Rao, B.L.S., 1983, *Nonparametric Functional Estimation*, Academic Press, New York.

C. Computer Software

1. Aptech Systems, Inc., *Gauss - System and Graphics Manual, Vol. I*.
2. Aptech Systems, Inc., *Gauss - Command References, Vol. II*.
3. Hanselman, D. and Littlefield, 2005, *Mastering MATLAB 7*, Pearson, Upper Saddle River, New Jersey.

Topics.

1. Density and Distribution Estimation

- 1.1 An overview
- 1.2 Density estimation: the Rosenblatt kernel density estimator and some of its finite and asymptotic properties under random sampling
- 1.3 Distribution estimation based on the Rosenblatt kernel density estimator and its asymptotic properties.
- 1.3 Bandwidth choice: an introduction to cross-validation and plug-in methods
- 1.4 Some variations on the basic estimator

2. Nonparametric Regression Estimation

- 2.1 The Nadaraya-Watson estimator
 - 2.2 The Local Polynomial estimators
 - 2.3 Some finite sample and asymptotic properties under random sampling
 - 2.4 Bandwidth choice
 - 2.5 Implementation and Monte Carlo simulations.
3. Additive Models of Regression
- 3.1 An introduction and discussion of identification
 - 3.2 Backfitting and marginal integration estimation
 - 3.3 An introduction to splines
 - 3.4 The spline backfitted kernel estimator
 - 3.5 Asymptotic properties and oracle efficiency
4. Conditional variance estimation
- 4.1 Residual based local linear estimation
5. Semiparametric Models
- 5.1 Partially linear models of regression
 - 5.2 Single index models of regression
 - 5.3 Semiparametric models for regression
 - 5.4 Nonparametric regression estimation with parametric covariance

Important information.

- If you qualify for accommodations because of a disability, please submit a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail dsinfo@colorado.edu.
If you have a temporary medical condition or injury, see Temporary Medical Conditions: Injuries, Surgeries, and Illnesses guidelines under Quick Links at Disability Services website and discuss your needs with me.
- Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, if the midterm, final or homework due dates prevent/inhibit you from exercising your rights to religious observance, please inform me by August 28, 2012 so that reasonable accommodations can be made. See full details at www.colorado.edu/policies/fac_relig.html.
- Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may

make appropriate changes to my records. See policies at www.colorado.edu/policies/classbehavior.html. and at www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code.

- All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at www.colorado.edu/policies/honor.html and at www.colorado.edu/academics/honorcode/.
- The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty. Sexual harassment is unwelcome sexual attention. It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combinations of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall. Any student, staff or faculty member who believes s/he has been sexually harassed should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at www.colorado.edu/odh/.