

**ECO 392M.7**  
**Advanced Econometric Theory II**

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Fall, 2003

ECB 3.130

Office hours: Tue. and Thu., 10:30–11:30, or by appointment

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**Required Texts:**

- A. Pagan and A. Ullah (1999), *Nonparametric Econometrics*, Cambridge: Cambridge University Press.
- B.W. Silverman (1986), *Density Estimation for Statistics and Data Analysis*, London: Chapman & Hall Ltd.

**Texts on Reserve:**

- B. Efron (1982), *The Jackknife, the Bootstrap and Other Resampling Plans*, Philadelphia: Society for Industrial and Applied Mathematics.
- B. Efron and R.J. Tibshirani (1993), *An Introduction to the Bootstrap*, New York: Chapman & Hall, Inc.
- W. Härdle (1990), *Applied Nonparametric Regression*, Cambridge: Cambridge University Press.

**Texts and Papers Online:**

Go to my web page (see above), click on “Course Materials for Students,” and follow the links.

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“Less-than-Fully-Parametric Estimation” would be a more descriptive title for this course. Whereas Econometrics II (ECO392M.3) focuses primarily on fully parametric estimation using the method of maximum likelihood, this course will consider alternative estimation strategies that require fewer (or at least weaker) assumptions on the statistical model.

The course will cover a continuum of estimation strategies, from fully nonparametric methods to (almost) fully parametric methods. Emphasis will be on practical application, although some discussion of theory is required to avoid pitfalls. Nonetheless, this will not be a theorem/proof class (despite the official title, which seems impossible to change due to bureaucratic inertia).

## (Tentative) Course Outline:

- I. Introduction
- II. Univariate Data Representation
- III. Histogram Density Estimators
  - A. Properties
  - B. Equivalent Sample Sizes
  - C. Data-Based Bin-Width Selection
  - D. Multivariate Setting
- IV. Kernel Density Estimators
  - A. Properties
  - B. Optimal Kernels
  - C. Higher-Order Kernels
  - D. How Hard is a Particular Density to Estimate?
  - E. Density Derivative Estimation
  - F. Bandwidth Selection
  - G. Boundary Effects
  - H. Multivariate Setting
- V. Kernel Regression
  - A. Bandwidth Selection
  - B. Confidence Intervals
  - C. Regression Derivatives
  - D. Quantile Estimation
  - E. Discrete Regressors
  - F. Multivariate Setting
- VI. Local Polynomial Regression
  - A. Design Adaptation
  - B. Boundary Effects
  - C. Bandwidth Selection
  - D. Multivariate Setting
- VII. Bootstrap Estimation
  - A. Confidence Intervals
  - B. Bootstrapping Regression Models
  - C. One-Sided Tests
  - D. Parametric versus Nonparametric Fits
- VIII. Estimating Productive Efficiency
  - A. Theory of the Firm Revisited
  - B. Set Estimators
  - C. Distance Function Estimators
  - D. Inference
- IX. Survival Analysis