In this course we shall study a unified framework for nonparametric and semiparametric kernel-based analysis. We focus on kernel-based methods capable of handling the mix of categorical (nominal and ordinal) and continuous datatypes one typically encounters in the course of applied data analysis. Applications will be emphasized throughout, and we shall use R for data analysis (http://www.R-project.org). Material will be taken mainly from Li, Q. and J. S. Racine (2007), Nonparametric Econometrics: Theory and Practice, Princeton University Press, ISBN: 0691121613 (768 Pages). The np package for R (http://www.r-project.org) will be used for the nonparametric and semiparametric analysis, and is available directly from the Comprehensive R Archive Network (http://cran.r-project.org).

We shall cover a range of topics in this course. In the early part of the course we shall emphasize the statistical underpinnings of the methods. Having been exposed to the underpinnings of nonparametric kernel-based methods, we will then leverage this to cover a range of topics of interest to applied researchers.

(1) Nonparametric density and probability function estimation (Li & Racine (2007), chapters 1, 3, 4)
(2) Nonparametric regression (Li & Racine (2007), Chapter 2)
(3) Conditional density and distribution function estimation (Li & Racine (2007), chapters 5 & 6)
(4) Semiparametric partially linear models (Li & Racine (2007), Chapter 7)
(5) Semiparametric single index models (Li & Racine (2007), Chapter 8)
(6) Semiparametric varying coefficient models (Li & Racine (2007), Chapter 9)
(7) Nonparametric testing of hypotheses (Li & Racine (2007), chapters 12 & 13)
Coverage

Day 1 During the first lecture we will introduce nonparametric methods, present a number of illustrative examples, compare and contrast nonparametric and parametric models, and then study the underpinnings of nonparametric density estimation. The workshop will introduce students to the R environment and the np package and have them conduct some rudimentary analysis.

Day 2 During this lecture we will build on the density estimation framework and then move into a regression framework. Motivating examples will be presented, and then we will study in detail the local constant and local linear estimators. The workshop will involve the use of parametric and nonparametric regression models in the R environment.

Day 3 During this lecture we will build on the regression framework and will look at constructing partial regression and gradient surfaces, assessing variability and conducting forecasts. We then will consider consistent hypothesis testing in a nonparametric framework. The workshop will continue to develop students' competence with R and will consider methods for assessing relative performance of parametric and nonparametric regression models.

Day 4 During this lecture we will consider a range of popular semiparametric regression models and then consider nonparametric methods for estimating binary and count outcome models and quantile models. The workshop will encourage students to begin working with their own datasets.

Day 5 During this lecture we will consider imposing constraints on nonparametric models and testing the validity of such constraints. We will also discuss nonparametric estimation of production frontiers. The workshop will encourage students to explore the range of nonparametric methods developed during the course.