BIOS 885 (Fall, 2012)
Nonparametric Statistics

Instructor: Peter Song. Office: M4140, SPH II; Phone: 764 9328; E-Mail:pxsong@umich.edu.

Time and Place: TTH 8:30-10:00AM, M4318, SPH II.

Office Hours: F 4:00-5:00pm; or by appointment.

Text : Lecture notes (available on the course webpage)

Grading:

Source	Weight
4 assignments	5% each
1 individual project	20%
1 midterm	25%
1 presentation (paper)	5 %
1 group term project	30%
Total	100%

Software: R and SAS.

Course Outline: Focus on advanced nonparametric methods, including kernel and spline smoothing techniques, and their applications in cross-sectional and longitudinal data analyses. Students are required to do data analysis and presentations.

- Nonparametric density estimation
- Nonparametric regression methods
- Generalized additive models
- Nonparametric analysis of longitudinal data

WARNING: I will specify a few reference books, and assign you to read relevant chapters from these books.

References:

- *Ruppert, Wand and Carroll (2003). Semiparametric Regression. Cambridge.
- Green and Silverman (1994). Nonparametric Regression and Generalized Linear Models, Chapman and Hall.
- Wand and Jones (1995). Kernel Smoothing, Chapman and Hall.
- Fan and Gijbels (1996). Local Polynomial Modeling and Its Applications, Chapman and Hall.
- Hastie and Tibshirani (1990). Generalized Additive Models, Chapman and Hall.
- Song (2007). Correlated Data Analysis: Modeling, Analytics and Applications, Springer.

Competencies covered in this course

Core Competencies:

1. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met. (partial)
2. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions. (partial)
3. Apply descriptive techniques commonly used to summarize public health data. (partial)
4. Apply common statistical methods for inference. (partial)
5. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question. (partial)
6. Interpret results of statistical analyses found in public health studies. (partial)

Biostatistics:

1. Develop knowledge to communicate and collaborate effectively with scientists in a variety of health-related disciplines to which biostatistics are applied (e.g. public health, medicine, genetics, biology; psychology; economics; management and policy). (partial)
2. Become well-versed in the application of core statistical techniques (biostatistical inference, linear regression, generalized linear models, nonparametric statistical methods, linear mixed models) and 4-5 selected statistical specialization techniques. (partial)
3. Select appropriate techniques and apply them to the processing of data from health studies. (partial)
4. Interpret the results of statistical analysis and convert them into a language understandable to the broad statistical community. (partial)
5. Develop written and oral presentation skills and other scientific reporting skills, based on statistical analyses for public health, medical and basic scientists and educated lay audiences. (partial)

Academic Integrity:

The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School. Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the

perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each students own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books or notes has been approved by an instructor, is a violation of the standard of academic conduct (Standard of Academic Conduct, University of Michigan School of Public Health).