PUBH 8422 MODERN NONPARAMETRICS, FALL 2015

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Course website:	http://www.biostat.umn.edu/~johnh/pubh8422.html
Moodle site:	https://ay15.moodle.umn.edu/course/view.php?id=3620
Credits:	3
Meeting days:	Monday and Friday
Meeting time:	2:30–3:45 pm
Meeting place:	Moos 2-116
Office hours:	Monday 11 am–noon or by appointment

1. COURSE DESCRIPTION

Classical nonparametric inference, exact tests, and confidence intervals. Robust estimates. The jackknife. Bootstrap and cross-validation. Nonparametric smoothing and classification trees. Models/applications. Formal development sufficient for understanding statistical structures/properties. Substantial computing.

2. COURSE PREREQUISITES

- statistics at the level of Stat 5102, and PubH 7406
- R programming experience

3. COURSE GOALS AND OBJECTIVES

This course will offer fairly broad coverage of modern nonparametric statistical methods and associated computing issues. Assignments will require reading, writing, deriving/proving, and programming. Computing will be done using R (or S-Plus). All submitted work must be typeset using LaTeX. No handwritten work will be accepted.

4. METHODS OF INSTRUCTION AND WORK EXPECTATIONS

Class meetings will be a mixture of lecture and discussion. Students are expected to attend class, participate in class discussions, and complete all homework assignments and the project. Students are also expected to complete reading assignments.

5. COURSE TEXT AND READINGS

Lecture notes and other materials will be available on the course website. There is no required text, but you may find useful one or more of the books listed at the end of this syllabus: Wasserman (2006); Hjort et al. (2010); Maindonald and Braun (2007); Ramsay and Silverman (2005); Higgins (2004); Fan and Gijbels (1996); Hastie et al. (2008).

6. COURSE OUTLINE

Week(s)	Topic
1	Introduction
2	Estimating the CDF and Statistical Functionals
3	The Bootstrap and Jackknife
4	Introduction to Smoothing
5–9	Nonparametric Regression
10	Generalized Additive Models
11	Nonparametric Bayes
12–13	Miscellaneous Topics, e.g., Permutation Procedures, Rank-Based Inference
14	Student Presentations

7. Evaluation and Grading

7.1. Homework Assignments. There will be five or six homework assignments during the semester. Students are encouraged to discuss the homework problems and to work together on the computing. However, each student is expected to write his/her submission independently. Typeset your submission using LaTeX. All assignments will involve computing; please hand in only relevant computer output. Note that submitted code should be commented and placed in an appendix.

You will have two weeks to complete each assignment. Late homework will not be accepted without prior approval from the instructor. Handwritten work will not be accepted.

7.2. Project. There will be a final project and presentation. Details will be handed out in October.

7.3. Grading.
- homework = 50%
- project = 50%

Each student's percentage grade will be converted to a letter grade according to the following table.

		B^+	87–89%	C^+	77–79%	D^+	67–69%
A	93–100%	B	83–86%	C	73–76%	D	63–66%
A^-	90–92%	B^-	80–82%	C^-	70–72%	F	0–62%

For those enrolled S/N, a letter grade of C- or better must be achieved to receive an S. The University Senate has established a uniform grading policy for all letter grades: `http://www1.umn.edu/usenate/usen/policies.html`. If you would like to switch grading options (e.g., A/F to S/N), it must be done within the first two weeks of the semester.

7.4. Course Evaluation. The SPH collects student course evaluations electronically using a software system called CoursEval at `http://www.sph.umn.edu/courseval`. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades as soon as the instructor enters the grades in SPHGrades: `http://www.sph.umn.edu/grades`. All students will have access to their final grades through OneStop two weeks after the last day of the semester whether they completed their course evaluations or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of your courses.

7.5. Incomplete Contracts. A grade of incomplete (I) shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an I requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and instructor. If an incomplete is deemed appropriate by the instructor, the student, in consultation with the instructor, will specify the time and manner in which the student will complete course requirements. Extension for completion of the work will not exceed one year (or earlier if designated by the student's college). For more information and to initiate an incomplete contract, students should go to SPHGrades at `http://www.sph.umn.edu/grades`.

7.6. University of Minnesota Uniform Grading and Transcript Policy. A link to the policy can be found at `http://onestop.umn.edu`.

8. Other Course Information and Policies

8.1. Grade Option Change. For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e., summer and half-semester courses) can be found at `http://onestop.umn.edu`.

8.2. Course Withdrawal. Students should refer to the refund and drop/add deadlines for the particular term at `http://onestop.umn.edu` for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Student Services Center at `sph-ssc@umn.edu` for further information.

8.3. Student Conduct Code. The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University, you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: `http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf`.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either student learning or the instructor's ability to teach. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

8.4. Use of Personal Electronic Devices in the Classroom. Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to set a policy for the use of personal electronic devices in the classroom. For complete information, please reference: `http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html`.

8.5. **Scholastic Dishonesty.** You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone, or in cooperation with another, to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: `http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf`) If it is determined that a student has cheated, he or she may be given an F or an N for the course, and may face additional sanctions from the University. For additional information, please see: `http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html`.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: `http://www1.umn.edu/oscai/integrity/student/index.html`. If you have additional questions, please seek clarification from your instructor. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class, e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

8.6. **Makeup Work for Legitimate Absences.** Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see: `http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html`.

8.7. **Appropriate Student Use of Class Notes and Course Materials.** Broadly disseminating class notes beyond the classroom community, or accepting compensation for taking and distributing classroom notes, undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: `http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html`.

8.8. **Sexual Harassment.** "Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: `http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf`.

8.9. **Equity, Diversity, Equal Opportunity, and Affirmative Action.** The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: `http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf`.

8.10. **Disability Accommodations.** The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, `https://diversity.umn.edu/disability`.

8.11. **Mental Health and Stress Management.** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: `http://www.mentalhealth.umn.edu`.

8.12. **The Office of Student Affairs at the University of Minnesota.** The Office for Student Affairs provides services, programs, and facilities that advance student success, inspire students to make life-long positive contributions to society, promote an inclusive environment, and enrich the University of Minnesota community. Units within the Office for Student Affairs include the Aurora Center for Advocacy & Education, Boynton Health Service, Central Career Initiatives (CCE, CDes, CFANS), Leadership Education and Development–Undergraduate Programs (LEAD-UP), the Office for Fraternity and Sorority Life, the Office for Student Conduct and Academic Integrity, the Office for Student Engagement, the Parent Program, Recreational Sports, Student and Community Relations, the Student Conflict Resolution Center, the Student Parent HELP Center, Student Unions & Activities, University Counseling & Consulting Services, and University Student Legal Service.

For more information, please see the Office of Student Affairs at `http://www.osa.umn.edu`.

8.13. **Academic Freedom and Responsibility (for courses that do not involve students in research).** Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.[1]

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Division Head, your adviser, the Associate Dean of the SPH, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

References

[1] Fan, J. and Gijbels, I. (1996). *Local Polynomial Modeling and Its Applications.* Chapman & Hall/CRC.

[2] Hastie, T., Tibshirani, R., and Friedman, J. (2008). *The Elements of Statistical Learning.* Springer-Verlag, 2nd edition.

[3] Higgins, J. J. (2004). *Introduction to Modern Nonparametric Statistics.* Brooks/Cole.

[4] Hjort, N. L., Holmes, C., Müller, P., and Walker, S. G., editors (2010). *Bayesian Nonparametrics.* Cambridge University Press.

[5] Maindonald, J. and Braun, J. (2007). *Data Analysis and Graphics Using R: An Example-Based Approach.* Cambridge University Press.

[6] Ramsay, J. O. and Silverman, B. W. (2005). *Functional Data Analysis.* Springer.

[7] Wasserman, L. (2006). *All of Nonparametric Statistics.* Springer.

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[1]Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students."