BIOSTAT/STAT 570: Advanced Regression Methods for Independent Data

3 credits, graded
Jon Wakefield

Time: Monday/Wednesday/Friday 1.30-2.30
Location: Health Science T473

Course Information (https://canvas.uw.edu/courses/1115124/pages/course-information)
Instructor Information (https://canvas.uw.edu/courses/1115124/pages/instructor-information)
R Code (https://canvas.uw.edu/courses/1115124/pages/r-code)

(https://canvas.uw.edu/courses/1115124/pages/course-project)
Course Information

Course Description:

BIOSTAT/STAT 570 covers regression methods for independent outcomes. It provides a more formal and general justifications for regression methods you may have seen in BIOST 514/515, STAT/BIOST 533, or STAT 502/504. Inference will be both Bayesian and frequentist, with the latter based on estimating functions (including likelihood).

This is a methods course, and the emphasis will be on application and interpretation of the methods discussed, in practical circumstances. Formal proofs and similarly-mathematical arguments are not a major part of the course though some theory will be encountered. You will be expected to be able to choose appropriate methods, implement them accurately, interpret the output accurately, and explain output in language appropriate for scientific collaboration. To do this, statistical insight, mathematical and computational skill, and ability to communicate are all essential.

Prerequisites:

STAT/BIOST 514/515 or STAT 502/504: in particular, I will assume you have some experience with how regression methods are motivated for making scientific comparisons.

STAT/BIOST 533 Theory of Linear Models, or equivalent: in particular, I will assume you have experience with matrix algebra, as a convenient way to describe and manipulate multivariate data.

STAT 512/513 Probability and Statistical Inference, or equivalent: in particular, I will assume you are familiar with parametric likelihood-based and Bayesian statements, as used with simple regression-based models.

Familiarity with R. You should be familiar with R's formula syntax, and should be able to design and implement simulation studies.

Syllabus:

Covers linear models, generalized linear and non-linear regression, and models. Includes interpretation of parameters, including collapsibility and non-collapsibility, estimating equations; likelihood; sandwich estimations; the bootstrap; Bayesian inference: prior specification, hypothesis testing, and computation; comparison of approaches; and diagnostics.
Assessment:

The course grade will be based on weekly homeworks and takehome midterm and final.

Textbook and Readings:


Disability Statement

Access and Accommodations: Your experience in this class is important to us, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you experience barriers based on disability, please seek a meeting with DRS to discuss and address them. If you have already established accommodations with DRS, please communicate your approved accommodations to your instructor at your earliest convenience so we can discuss your needs in this course.

Disability Resources for Students (DRS) offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu.

Academic Integrity

Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (http://www.washington.edu/cssc/student-conduct-overview/student-code-of-conduct/) (WAC 478-120). We
expect you to know and follow the university’s policies on cheating and plagiarism, and the SPH Academic Integrity Policy (http://sph.washington.edu/students/academicintegrity/). Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington Community Standards and Student Conduct (http://www.washington.edu/cssc/) website.

**For Courses with TAs**

If you have any concerns about the class or your TA, please see the TA about these concerns as soon as possible. If you are not comfortable talking with the TA or not satisfied with the response that you receive, you may contact the Department of Biostatistics Associate Director of Academic Affairs (biostgp@uw.edu (mailto:biostgp@uw.edu)). If you are still not satisfied with the response that you receive, you may contact the Department of Biostatistics Chair (bchair@uw.edu (mailto:bchair@uw.edu)). You may also contact the Graduate School at G-1 Communications Building, by phone at 206-543-5139 or by email at raan@uw.edu (mailto:raan@uw.edu).
Instructor Information

Grading: Coursework (40%), mid-term (25%), final (35%).

JW Office Hour: Monday 4-5, Health Sciences F664.
Or by appointment: jonno@uw.edu Phone: 616-6292.

TAs:

- Aaron Baraff, ajbaraff@uw.edu
- Nanxun Ma, nanxunma@uw.edu
- Ernesto Ulloa, ulloae@uw.edu

TA Office Hours:

- Thursdays (Nanxun/Ernesto), 8:30--9:30, T635 in Health Sciences Building
- Wednesdays (Aaron), 12-1, CMU B023 in Communications building