

School of Public Health

PubH 6451-section 1

Biostatistics 2

Spring 2012

Credits: 4**Meeting Days:** M-W 10:10–12:05, Moos 2-530**Course Website:** www.biostat.umn.edu/~will/ph6451.html or, tinyurl.com/PubH6451**Instructor:** William Thomas**Fax:** 612-626-0660**Office Address:** A-467 Mayo**E-mail:** thoma003@umn.edu**Office Phone:** 612-625-0651**Office Hours:** Wednesdays 2:15–3:15**I. Course Description**

Description: PubH 6451 is the second semester of an introduction to biostatistics, statistical methods applied in the health sciences. This course covers a broad range of methods, with a focus on their practical use and interpretation in clinical trials and observational studies. Themes of the course are adjusting comparisons of study groups by regression or stratification, and understanding interactions between adjustors and the groups. A paper from a health-science journal is assigned in each homework: students will repeat the analysis in the paper and critique the methods and results. Computations will be illustrated in SAS, with discussion of basic programming elements and output for the homework. The course covers methods for working with continuous measurements (t-tests, linear regression, ANOVA), measurements in categories (risk, rates, odds, logistic and Poisson regression), and measurements of time until an event occurs (survival data, proportional hazards regression).

II. Course Prerequisites

[[[6420, 6450] or [6414, 6415]] with grade of at least B, health sciences grad student] or instr consent

III. Course Goals and Objectives

Present methods for comparing study groups based on continuous outcomes or binary outcomes, using regression methods to adjust the comparison. Students will critique papers from health science journals illustrating these methods, to develop their understanding of these statistical approaches and their limitations. Students will use SAS to apply each method and will be able to understand and use SAS output produced.

IV. Methods of Instruction and Work Expectations

Lectures and homework assignments. Assignments will be due at the start of the class, and we will immediately discuss the problems and answers, so please make a photocopy for reference during class. Late homework will not be accepted.

Computing. The course will include examples of data analysis from SAS, version 9.2. You will need SAS output to complete your homework. There are several choices:

1. Use PC-SAS in the computing lab, Mayo C-381, during the TA office hours. As in 6450, you may copy example programs and data files from the course website.

2. PC-SAS is also available at these computing labs:

Biomed Library: <http://hsl.lib.umn.edu/biomed/services/computerlab>

Coffey Hall (St P): <http://www.oit.umn.edu/computer-labs/locations-hours/index.htm>

3. If you have access to SAS at work, you should do your homework there. You can download all data files and example programs from the course web-site.
4. The annual license for PC-SAS through the University of Minnesota is \$75:
<http://www.oit.umn.edu/utools/mathematics-statistics/index.htm>
5. You may work with a group of students on the homework, and share SAS output. I don't insist that every student run SAS programs, but every student must write their own homework answers.
6. You may do all computing remotely on saturn, a Biostat unix server. You can log in from home, but there is no graphical interface. Please let me know if you want an account on saturn.

V. Course Text and Readings

PubH 6451 course notes packet (required)

Moore and McCabe: *Introduction to the Practice of Statistics, (6th ed.)* (text from PubH 6450)

On reserve at the Biomed Library:

Moore and McCabe: *Introduction to the Practice of Statistics, (6th ed.)*

Glantz: *Primer of Biostatistics*

Dawson and Trapp: *Basic and Clinical Biostatistics (4th ed)*

Kirkwood and Stern: *Essential Medical Statistics, (2nd ed)*

Dupont: *Statistical Modeling for Biomedical Researchers, 2nd ed.* (uses STATA)

Vittinghoff et al: *Regression Methods in Biostatistics* (more mathematical, uses STATA)

Delwiche and Slaughter: *The Little SAS Book (4th ed.)*

Allison: *Logistic regression using the SAS system: theory and application*

Collett (2003): *Modelling Survival Data in Medical Research, 2nd ed.*

VI. Course Outline/Weekly Schedule

Next page

VII. Evaluation and Grading

The final grade is based on homework (25%), two tests (25% each), and the final exam (25%). The curve for final grades will be: A = 95–100; A- = 90–94; B+ = 85–89; B = 80–84; B- = 75–79; C+ = 70–74; C = 65–69; C- = 60–64; F = below 60. For those registered S/N, S = 60-100. Depending on how the final course averages turn out, I may lower some grade lines, but I will not raise them.

Incomplete Grade

A grade of "I" (incomplete) will not be permitted except in the case of a documented emergency (e.g., medical). If an incomplete is deemed appropriate by the instructor, the student, in consultation with the instructor, will prepare a detailed written agreement specifying the time and manner in which the student will complete the course requirements. The written contract will give explicit details for every component of the course which remains to be completed. Extension for completion of the work will not exceed one year. **The written agreement must be registered with the Student Services Center prior to the date by which grades must be entered at the end of the term.** If the student does not comply and meet the deadlines as determined in the written agreement, a grade of "F" or "N" will be officially submitted by the Student Services Center.

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

Syllabus for PubH 6451: *Biostatistics 2*

<i>Date</i>	<i>Topics</i>
<i>January</i>	18 Review: t -tests, p -values, standard errors
	23 t -tests, multiple comparisons
	25 one-factor ANOVA
	• 30 Displaying significant differences between means
<i>February</i>	1 Factorial treatment designs
	6 Standard error bars and significant differences
	8 Analyzing data on the log scale; simple linear regression
	• 13 Linear regression with one predictor
	15 Multiple linear regression: more than one predictor
	20 Adjusting comparison of groups with strata
	22 Adjusting comparison of groups with regression
	• 27 Issues in adjusting comparisons
	29 Adjusting a comparison with observational data: Framingham Study
<i>March</i>	5 Comments on regression; review
	7 Test 1
	<i>Spring Break</i>
	19 Estimating sample size, calculating power
	21 Review: tables of counts, chi-square test, odds ratio, relative risk
	26 Adjusted comparison of odds: Cochran-Mantel-Haenszel (CMH) test; logistic regression
	28 Logistic regression
<i>April</i>	• 2 Logistic regression: adjusting the comparison of odds
	4 Conditional logistic regression; logistic regression examples
	9 Survivor function and the Kaplan-Meier estimate
	11 Comparing survivor functions: log-rank and Wilcoxon tests
	• 16 Survival analysis examples; review
	18 Test 2
	23 Hazard function
	25 Proportional hazards regression: adjusting the comparison of hazards
	30 Proportional hazards regression examples
<i>May</i>	• 2 Poisson regression: adjusting the comparison of rates
	10 Final Exam: 1:30–3:30 Thursday, 10 May (in Moos 2-530)

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- homework assignment due

VIII. Other Course Information and Policies

Grade Option Change (if applicable)

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

Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at 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

Student Conduct, Scholastic Dishonesty and Sexual Harassment Policies

Students are responsible for knowing the University of Minnesota, Board of Regents' policy on Student Conduct and Sexual Harassment found at www.umn.edu/regents/polindex.html.

Students are responsible for maintaining scholastic honesty in their work at all times. Students engaged in scholastic dishonesty will be penalized, and offenses will be reported to the Office of Student Academic Integrity (OSAI, www.osai.umn.edu).

The University's Student Conduct Code defines scholastic dishonesty as "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; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis."

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: <http://writing.umn.edu/tww/plagiarism/>.

Students are urged to be careful that they properly attribute and cite others' work in their own writing. For guidelines for correctly citing sources, go to <http://tutorial.lib.umn.edu/> and click on "Citing Sources".

In addition, original work is expected in this course. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable.

If you have any questions, consult the instructor.

Disability Statement

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have a documented disability (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services to have a confidential discussion of their individual needs for accommodations. Disability Services is located in Suite 180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 (voice or TTY).