
Credits: 4

Meeting Days and Place: Tu-Th 11:15–12:30, Moos 2-520

Course Website: tinyurl.com/pubh6470 or <http://www.biostat.umn.edu/~will/ph6470.html>

Instructor: William Thomas

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Office Hours: Wednesdays 2:30–3:30

I. Course Description

PubH 6470 introduces students with a background in statistics to programming, graphics, and data analysis using SAS. The course concentrates on programming using PC-SAS, data editing and reformatting, as well as statistical applications of SAS procedures: general linear models, logistic regression, longitudinal mixed-effects models, and survival data.

II. Course Prerequisites

A one year course in applied statistics at the level of Pubh 6451, Pubh 7406, Stat 5021 or Stat 5302, or permission of the instructor.

III. Course Goals and Objectives

To provide students experience and practice using SAS to (i) identify and fix errors and problems in data; (ii) write and debug programs; (iii) make and revise graphics; (iv) manage a statistical analysis project and report their results; and learn to use SAS and internet resources to solve problems and learn new SAS procedures.

IV. Methods of Instruction and Work Expectations

Lectures, homework assignments, take-home exams. 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. Students may discuss homeworks and final projects with other classmates but you must write your own SAS programs, and your homework and exams must be completed independently.

V. Course Text and Readings

Students are encouraged to purchase PC-SAS version 9.2 through the University of Minnesota for \$75/year.

On Reserve at the Biomed Library:

- *The Little SAS Book 4th ed.* by Delwiche and Slaughter, 2008, SAS Institute
- *SAS Programming for Researchers and Social Scientists* by Phil Spector, Sage
- *Data Analysis Using Regression and Multilevel/Hierarchical Models* by Gelman and Hill, 2007, Cambridge
- *Analysis of Clinical Trials Using SAS* Dmitrienko, Molenberghs, Chuang-Stein, Offen, 2005, SAS Institute
- *SAS for Mixed Models, 2nd ed.* by Littell, Milliken, Stroup, Wolfinger, Schabenburger, 2006, SAS Institute
- *Logistic regression using the SAS system: theory and application* by Paul Allison, 2001, Wiley-SAS
- *Categorical Data Analysis Using the SAS System, 2nd ed.* by Stokes, Davis, and Koch, 2009, SAS Institute

Syllabus for PubH 6470: *SAS Procedures and Data Analysis*

<i>Date</i>	<i>Topics</i>
September 6	1 Intro to PC-SAS: importing a spreadsheet, working with 3 windows
8	2 Basic tests, arithmetic and comparisons, missing values
•13	3 Character variables, SET and MERGE, DO-loops, standardizing a variable
15	4 Checking data, Proc Insight graphics, data set options, more on MERGE
20	5 Working with dates, simple macros, arrays, computing change from baseline
22	6 Graphics: SGplot, Gplot
•27	7 Linear models: math scores, Proc Corr plots, outliers, log transformation
29	No class
October 4	8 Proc Reg: subset selection, ODS plots, fitted values
6	9 Proc GLM: indicator variables, class variables
•11	10 Multi-factor ANOVA: rat diets, LSmeans, interaction plot
13	11 Proc GLM: What are LSmeans?
18	12 Linear models: back-transformation, ODS select and ODS output; program structure
20	13 Confounding, mediation; reading a spreadsheet with problems; converting variable type
•25	14 Bootstrap, Proc Surveyselect
27	15 Bootstrap tests; missing data and imputation
	Midterm exam handed out; due 1 Nov in class
November 1	16 Logistic regression: Proc Logistic, odds ratios, interactions, diagnostics
3	17 Percent correctly classified, subset selection, conditional logistic regression,
8	18 Log-binomial regression, ordinal regression (more than 2 categories of response)
10	19 Propensity scores and matching
•15	20 Proc SQL, fuzzy merge; Longitudinal data: plots, long vs wide format,
17	21 Longitudinal data: Proc Transpose, area under the curve (AUC)
22	22 Longitudinal data: Proc Mixed, correlation matrix, random effects, mixed-effects models
24	Thanksgiving: no class
29	23 Longitudinal data: mixed model example (rat diets again)
December 1	24 Crossover designs
•6	25 Survival data
8	26 Proportional hazards regression
13	Proportional hazards regression; final exam handed out
December 20	Final Exam due at 4:00 in Mayo A-460 (Biostat Office)

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- homework assignment due (tentative)

VII. Evaluation and Grading

The final grade will be based on homework assignments (60%) and take-home mid-term and final exams (20% each). 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 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: www.sph.umn.edu/grades. **The written Incomplete Contract must be registered with the Student Services Center prior to the date by which grades must be entered at the end of the term.**

Course Evaluation

Beginning in fall 2008, the SPH will collect student course evaluations electronically using a software system called CoursEval: 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 just as soon as the faculty member renders the grade in SPHGrades: 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 regardless of whether they completed their course evaluation 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 the courses for which you are registered.

University of Minnesota Uniform Grading and Transcript Policy

A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)

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 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 SPH Associate Dean for Academic Affairs who may file a report with the University’s Academic Integrity Officer.

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. Unless the instructor has specified otherwise, all assignments, papers, reports, etc. should be the work of the individual student. 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.

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).