PubH 7450. Survival Analysis

Fall 2013

- Instructor: Dr. Wei Pan, Professor of Biostatistics
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  Office hours: 2:15pm-3:15pm, Tu&Th

- TAs: Ms Kristen Cunanan, Email: cunan001@umn.edu, Office hours: 12:10-1:10 W, 11:30-12:30 Th, A446 Mayo
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- Prerequisites: PubH 7405 (Linear Regression), PubH 7407 (Analysis of Categorical Data), Stat 5101-5102 (Theory of Statistics).
  Students are supposed to know concepts of distributions, statistical estimation and hypothesis testing; linear regression; maximum likelihood theory, among others, and to have some experience in using the SAS and R.

- For whom intended: Second-year Biostatistics/Statistics MS/MPH and other graduate students who intend to do intensive statistical data analysis.

- Number of credits: 3

- Course description and learning objectives: This course deals with analyzing survival times, which may be censored and/or truncated. The main topics are: 1) estimating a survival curve; 2) comparing two (or more) survival curves; 3) regression analysis.

  This is a more applied course, though both theoretical and applied materials will be covered. In particular, this is **not** a course only on how to run a SAS program and interpret its output; in addition, you also need to know underlying statistical procedures, including their modeling assumptions and possibly their derivations, from which, hopefully, you will learn to appreciate some general statistical principles.

  Both SAS and R will be used.

- Methods of instruction and work expectations: In-class lectures are the main method of instruction. Students are expected to come to class and participate in discussions, read the textbook, and finish (almost biweekly) assignments and a course project. Late assignment is not accepted unless with *in advance* permission from the instructor (see below) or with other legitimate reasons (such as illness).

- Textbooks: to be reserved in the Bio-Medical Library (Diehl Hall) and probably in the Biostatistics Reading Room (A460).

  - (REQUIRED) J.P. Klein and M.L. Moeschberger, *Survival Analysis*, 2nd edition. Springer, 2003.
  - (Optional) P.D. Allison, *Survival Analysis using the SAS System.* SAS Institute Inc., 1995.
  - (Optional) T.M. Therneau, P.M. Grambsch, *Modeling Survival Data, Extending the Cox Model.* Springer, 2000.

- References: to be reserved in the Bio-Medical Library (Diehl Hall) and probably in the Biostatistics Reading Room (A460).
  - Collett, C. (1994), *Modeling Survival Data in Medical Research.*
  - Cox, D.R. (1984). *Analysis of Survival Data.*
  - Kalbfleisch, J.D. and Prentice, R. (2002). *Statistical Analysis of Failure Time Data*, 2nd edition.
  - Le, C.T. (1997). *Applied Survival Analysis.*
  - Miller, R.G. (1981). *Survival Analysis.*
- Course schedule:
  1. Introduction to survival analysis: Chapters 1-3; 2 weeks.
  2. Estimating a survival curve: Chapter 4; 3 weeks.
  3. Comparing 2- (or K-) survival curves: Chapter 7; 3 weeks.
  4. Proportional hazards regression: Chapters 8, 9 and 11; 5 weeks.
  5. Parametric regression models: Chapter 12; 1 week.
  6. Multivariate survival analysis: Chapter 13; 1 week.
  7. Other topics (e.g. nonparametric AFT): 1 week
- Evaluation and grading:

  Homework assignments will involve some theoretical problems and running SAS or R programs to analyze data. I assume that everyone has working knowledge about using SAS and R. I will distribute and put relevant SAS or R programs of discussed examples on our course homepage **http://www.biostat.umn.edu/~weip/course/7450/f13/home.html**.
  You are strongly encouraged to try these programs. Larger data sets for homework will be accessible from
  http://www.biostat.mcw.edu/homepgs/klein/book.html
  or from our course homepage. Please note that it is required to include in your write-up your SAS or R programs, **only** relevant parts of output, major steps of hand calculations, and necessary interpretations/conclusions. Students are allowed to discuss homework problems, however, each one is expected to program and write up **independently**; **Copying other's work, including computer programs, is cheating or plagiarism, which will lead to an automatic "F" and possible reporting to the University office.** Each assignment is due at the beginning of class, typically one week after assigned. Late homework is counted down 20% for each day of lateness, with the first 20% accruing to homework handed in **after** class on the due date. With some legitimate reasons (e.g. illness with appropriate documents), you need to notify me **in advance** or as early as possible to obtain my approval and thus receive no credit deduction.

  There will be an **in-class midterm exam** around Week 8, and a final exam. An in-class exam will be closed book, but you can bring one page (for mid-term) or two pages (for final exam) of notes (8x11in size). For either exam, you need to understand your course notes/textbooks (and homework problems). In particular, exam problems will **not** be only a subset of homework problems. If you cannot take the midterm exam for some legitimate

reasons either unforeseen or with *my approval in advance*, there will be no make-up exam and your grade will be based on the final exam, suitably pro-rated.

Course evaluation will be based on homework assignments, midterm exam and final exam with weights 40%, 20% and 40% respectively. The final grade is based on a weighted average score of a student's performance in the above three items.

S = Achievement that is satisfactory will be expected to complete all assignments and receive a minimum of 65% to receive a passing score.

- Policy on incompletes:

  I (Incomplement) is assigned at the discretion of the instructors when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. Requires a written agreement between the instructors and student. Extension for completion of the work will not exceed one year, after which time the "I" converts to an "F" or "N".

- Course withdrawal policy:

  Students may change grading options without written permission as specified by the University and without penalty during the initial registration period or during the first two weeks of the semester. No `W` will appear on the transcript.

  After the second week students are required to do the following:

  - The student must contact and notify their advisor and course instructor informing them of the decision to withdraw from the course.
  - The student must send an e-mail to the SPH Student Services Center (SSC). The email must provide the student name, ID#, course number, section number, semester and year with instructions to withdraw the student from the course, and acknowledgement that the instructor and advisor have been contacted.
  - The advisor and instructor must email the SSC acknowledging the student is canceling the course. All parties must be notified of the student's intent.
  - The SSC will complete the process by withdrawing the student from the course after receiving all emails (student, advisor, and instructor). A `W` will be placed and remain on the student transcript for the course.
  - After discussion with their advisor and notification to the instructor, students may withdraw up until the eighth week of the semester. There is no appeal process.

- Scholastic dishonesty:

  Scholastic dishonesty is a violation of the student conduct code and is defined as any act that violates the rights of another student in academic work or that involves misrepresentation of your own work. Scholastic dishonesty includes (but is not limited to): cheating on assignments or examinations; plagiarizing, which means misrepresenting as your own work any part of work done by another; submitting the same paper, or substantially similar papers, to meet the requirements of more than one course without the approval and consent of all instructors involved; depriving another student of necessary course materials; or interfering with another student's work. Scholastic dishonesty in any portion of the academic work for a course shall be grounds for awarding a grade of `F` or `N` for the entire course. Please consult the student conduct code at http://www.umn.edu/regents/policies/academic/StudentConduct.html.

- Disability accommodation::

  Any student with a documented disability (e.g., physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the instructor and Disability Services at the beginning of the semester. All discussions will remain confidential. For further information contact the University of Minnesota Disability Services website at http://disserv3.stu.umn.edu/index2.html or call 612/626-1333 (V/TTY).