Survival Data Analysis

University of Iowa
BIOS:7210 (STAT:7570 / IGPI:7210)
Fall 2017
Credit: 3 s.h.

Instructor:	Prof. Patrick Breheny
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Office hours:	1:50 - 2:30 Tue/Thu plus any time my door is open;
	otherwise, please e-mail to set up an appointment.

Lecture:	12:30 p.m - 1:50 p.m.
	Tuesday & Thursday
	C301 CPHB

Course description: This course covers *time to event* data, which arises often in biostatistics, especially in the context of studying human survival following a medical intervention. The fundamental challenge of survival data, and the primary reason it requires its own specialized statistical methods, is that typically the data is only partially observed – i.e., it is censored. This covers covers the extension of likelihood methods to accommodate censoring and the related concept of truncation. We will cover standard nonparametric approaches to estimating survival, testing for differences between groups, and calculating power and sample sizes. We will also cover parametric approaches to regression models based on relative risk and accelerated failure time models and the semiparametric Cox (proportional hazards) model. By the end of the course, you should understand the primary methods for analyzing survival data along with their derivation and theoretical foundations, as well as feel comfortable using these methods to analyze real data.

Textbook: *The Statistical Analysis of Failure Time Data*, 2nd edition (2002), KALBFLEISCH, J. D. and PRENTICE, R. L.. D. Wiley.

Also a very good textbook: *Survival Analysis: Techniques for Censored and Truncated Data*, 2nd edition (2003), KLEIN, J. P. and MOESCHBERGER, M. .L. Springer.

Prerequisite: BIOS:5720 (or equivalent) and either STAT:4101 or STAT:5101.

Course website: The course notes, assignments, data sets, and other relevant materials will be made available on the course web site:
http://myweb.uiowa.edu/pbreheny/7210/f17

Homework: There will be one homework assignment per week, due the following week at the beginning of class on Thursday. Graded assignments will be returned the following week. If you turn in an assignment on Friday, I will still grade and return it to you, but a 50%

penalty will be deducted.

Feel free to compare answers with other students, although each student must turn in a copy of each assignment. Group discussions are not only great ways to make lasting friendships, they are valuable for retention and understanding of the material, and working well in a group is a vital part of being a professional. However, make sure you understand the material, as half of your overall grade comes from your exam scores.

Computing: Homework for this course will often involve the use of a computer. You may use any statistical software you would like for this analysis, although the software I will cover is `R`. `R` is free and open-source, available on all computers throughout the building, and easy to install on a personal computer for all operating systems.

Exams: There will be two midterm exams in this class. All exams are closed-book, although students may bring one page of notes if they wish to do so. The exams will take place during class time on the following dates:

Exam 1	Thursday, September 28
Exam 2	Thursday, November 9

You will be asked to perform calculations on these exams, so bring a calculator – not a cell phone – with you.

Grading: Your grade will be based on a weighted average of homework (25%), Exam 1 (25%), Exam 2 (25%), and a final project (25%).

Attendance: Regular attendance in this course is expected. No direct penalty will be applied for missing lectures. However, assignments and exams will be based entirely on lecture material, so skipping lecture is likely to hurt your grade and, of course, your understanding of the material.

Corrections: Despite my best efforts, my notes occasionally have mistakes in them. If you spot a mistake, I very much want you to let me know about it so that I can correct it. I will award 1 bonus point (to be added to your homework total) for pointing out a typographical error and 3 bonus points for an error in content. Corrections will be made to the online version of the notes and any substantive errors announced on the course home page.

Electronic communication: I will occasionally send notices to the class through e-mail (to your `uiowa.edu` account), so please check that account regularly.

Course schedule: See http://myweb.uiowa.edu/pbreheny/7210/f17/notes.html for the schedule of topics.

I look forward to getting to know you, and I hope that we have a great semester together.

Academic misconduct: During exams, you are not allowed to copy off another student, consult reference materials (beyond the one sheet of allowed notes), or use a cell phone or any device capable of messaging, texting, or accessing the internet. Any of these actions will be considered cheating. On homework assignments and the final project, you are not allowed to copy and paste text or code from another student (if you copy text from some other source, it must be cited). Doing so will be considered plagiarism. The University of Iowa takes cheating and plagiarism very seriously. You can read more about the consequences of academic misconduct at http://dos.uiowa.edu/policies/academic-misconduct.

PhD in Biostatistics competencies:

- Demonstrate an increased level of knowledge and understanding of current statistical theory, methods, and practices in the health sciences.

- Design, manage data, analyze and interpret data from a variety of experimental and observational studies.

- Communicate research findings, including new statistical methods developed, effectively to various audiences in writing and through oral presentation.

MS in Biostatistics competencies:

- Demonstrate a broad knowledge and understanding of current statistical theory, methods, and practices in the health sciences.

Concerns about faculty actions: Students with suggestions or complaints should see me first, and if we cannot come to an agreement, I will direct you to the Departmental DEO, Prof. Joseph Cavanaugh, N332 CPHB, joe-cavanaugh@uiowa.edu. Students may also contact the Associate Dean for Education and Student Affairs in the College of Public Health. Another resource for students is the Office of the University Ombudsperson. If a complaint cannot be resolved at the departmental and/or collegiate level, students may file a formal complaint utilizing the procedure specified in Section II, Chapter 29.7 of the Operations Manual: http://opsmanual.uiowa.edu.

Accommodations for disabilities: The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services (SDS) and then meet with the course instructor privately in their office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See http://sds.studentlife.uiowa.edu for more information.

Administrative home: This course is given by the College of Public Health. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Public Health. Students wishing to add or drop this course after the official deadline must receive the approval of the Associate Dean for Academic Affairs in the College of Public Health. Details of the University policy of cross

enrollments may be found at: https://www.provost.uiowa.edu/sites/provost.uiowa.edu/files/crossenroll.pdf.

Reacting safely to severe weather: In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit http://hawkalert.uiowa.edu.

Sexual harassment/misconduct and class accommodations: Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported to the UI Office of Sexual Misconduct Coordinator (OSMRC), or to the Office of Equal Opportunity and Diversity (EOD). Students impacted by a Title IX issue (sexual misconduct, dating/domestic violence, or stalking) may be eligible to request an academic accommodation. See the OSMRC for assistance, definitions, and the full University policy at https://osmrc.uiowa.edu. Additional information about confidential resources for students subject to sexual harassment/misconduct is available at https://osmrc.uiowa.edu/victim-resources/confidential-support.