Survival Data Analysis

University of Iowa
BIOS:7210 (STAT:7570)
Fall 2015
Credit: 3 s.h.

Instructor:	Prof. Patrick Breheny
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Office hours:	If my office door is open, feel free to knock;
	Otherwise, please e-mail to set up an appointment.

Lecture:	1:00 p.m - 2:20 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.

Prerequisite: BIOS:5720 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/f15`

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 package 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, October 1
Exam 2   Thursday, November 12

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. This will no doubt be especially true this semester, as this is my first time teaching this course. 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 three 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/f15/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. For 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 both cheating and plagiarism very seriously, and has in place a number of rather severe academic sanctions: `http://dos.uiowa.edu/policies/academic-misconduct`.

Complaints: 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, N312 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`.

Disabilities: If anyone has a disability requiring special accommodations, please let me know as soon as possible, so that these arrangements can be made. For more information, visit: `http://sds.studentlife.uiowa.edu`.

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 and Student Affairs in the College of Public Health. Details of the University policy of cross enrollments may be found at: `http://test.sitenow.uiowa.edu/provost/files/provost.uiowa.edu/files/crossenroll.pdf`.

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`.

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.

Sexual Harassment: 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 immediately. The policy in its entirety may be found at Section II, Chapter 4 of the Operations Manual: `http://opsmanual.uiowa.edu`.

If you or someone you know may be a victim of sexual assault, sexual harassment, dating/domestic violence, stalking, or any other behaviors prohibited under this policy, you are strongly encouraged to seek assistance and support. Assistance is available 24 hours a day, 7 days a week, from:

- Rape Victim Advocacy Program (RVAP) – confidential, certified victim advocacy services, 319-335-6000

- Domestic Violence Intervention Program (DVIP) –confidential, certified victim advocacy services, 319-351-1043or 800-373-1043

- Emergency Department, University of Iowa Hospitals and Clinics – confidential medical services, 319-356-2233

- University of Iowa Department of Public Safety – law enforcement services, 319-335-5022, or 911 from any campus phone

During business hours, you may also seek assistance from the University of Iowa Office of the Sexual Misconduct Response Coordinator at 319-335-6200.