SYLLABUS
EPID 686: Survival Analysis
Spring 2016

Time: Monday and Wednesday 2:00 -3:15 PM   **Location**: Drachman Hall A119

Instructor:
Paul Hsu, Ph.D.
Office: Drachman A232
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Office Hours: Monday 1:00-2:00PM, Appointment Recommended
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Course Description:
This course introduces basic concepts and methods for analyzing survival time data obtained from following individuals until occurrence of an event or their loss to follow-up. We will begin this course from describing the characteristics of survival (time to event) data and building the link between distribution, survival, and hazard functions. After that, we will cover non-parametric, semi-parametric, and parametric models and two-sample test techniques. In addition, we will also demonstrate mathematical and graphical methods for evaluating goodness of fit and introduce the concept of dependent censoring/competing risk. During the class, students will also learn how to use SAS to analyze survival data.

Course Prerequisites:
CPH 576A Biostatistics for Public Health; CPH 576B Biostatistics for Research

Course Objectives:
 Students completing this course should be able to:
1. Recognize the characteristics of survival data, e.g. censoring and truncation.
2. Determine the proper method to be used in analyzing time-to-event data (e.g., parametric, semi-parametric or non-parametric method).
3. Understand the assumptions for the method chosen to analyze the data.
4. Apply mathematical and graphical methods to check goodness of fit.
5. Perform survival analysis using a computer statistical software package.
6. Interpret computer outputs.
7. Assess the quality of survival analysis conducted in published research papers.

Biostatistics Competencies:
1. Ability to identify appropriate statistical tools to address specific scientific questions
2. Ability to select appropriate research designs to meet the needs of various studies, and be able to explain the limitations of implemented designs
3. Ability to skillfully engage in statistical collaboration with mentors, colleagues, and clients
4. Demonstrate excellent presentation skills and the ability to explain statistical concepts and findings to a general scientific audience
5. Demonstrate skills in data management to handle a variety of practical problems in data format and structure

6. Demonstrate advanced working skills in application of computer systems and appropriate statistical software
7. Demonstrate advanced competencies in areas of professional expertise and scholarship enabling them to advance to further postgraduate study in biostatistics
8. Demonstrate understanding of methods of data analysis and data monitoring

Course Notes:
Handouts will be uploaded to the course D2L site prior to the lecture.

Required Text:
Survival Analysis – Techniques for Censored and Truncated Data, John P. Klein and Melvin L. Moeschberger (KM), Springer.

References:
Survival Analysis Using SAS: A Practical Guide, Paul D. Allison.
- Those who want to analyze survival data with SAS will find just what they need with this easy-to-read and comprehensive guide. Written for the reader with a modest statistical background and minimal knowledge of SAS software, this book teaches many aspects of data input and manipulation, as well.

Survival Analysis: A Self-Learning Text, David G. Kleinbaum and Mitchel Klein
- An excellent tutorial on survival analysis, including Cox proportional hazards models.

Course Requirements:
Successful completion of all homework assignments, one final project and two examinations (midterm and final), and active class participation.

Grading/Student Evaluation:
Homework assignments will be from the text, and readings and problems provided by the instructor. Due dates will be given for each assignment. Late homework will not be accepted.

On both homework and examinations, partial credit will be given, so always show your work and be as neat and clear as possible. Grades will be assigned as follows (tentative plans):

Homework	30%
Midterm Exam	10%
Final Project	50%
Participation	10% (participate in class discussions in class or on-line)

Final grades are based on the following point system:
- A = 90 - 100%
- B = 80 – 89%
- C = 70 –79%
- D = 60 – 69%
- E = 59% or less

Announcements:
A D2L course site will be created for this course. All course announcements will be posted on the site. So check out the course site constantly! In addition, a list of students taking this course can be found on the course site. Students can use the list to find their study partners and exchange experience.

Class Attendance/Participation:

I am not going to keep track of attendance, but you are responsible for everything that goes on in class, including any alteration to the syllabus. If I make an announcement in class, you are responsible for it (I do, however, try to remember to confirm important announcements by e-mail). I strongly encourage you to develop a "buddy system" with one or more other students to take notes and announcements down if, for some unavoidable reason, you are unable to make it to class on a particular day. I will try to be in class about 15 minutes early and stay 15 minutes late to handle questions.

Communications: You are responsible for reading emails sent to your UA account from your professor and the announcements that are placed on the course web site. Information about readings, news events, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: http://www.registrar.arizona.edu/emailpolicy.htm

Disability Accommodation: If you anticipate issues related to the format or requirements of this course, please meet with me. I would like us to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. The official policy can be found at: http://catalog.arizona.edu/2008%2D09/policies/disability.htm

Academic Integrity:
Students are expected to abide by the University of Arizona Code of Academic Integrity found at http://deanofstudents.arizona.edu/sites/default/files/code_of_academic_integrity.pdf.

Classroom Behavior: (Statement of expected behavior and respectful exchange of ideas)
Students are expected to be familiar with the UA Policy on Disruptive Behavior in an Instructional Setting found at http://web.arizona.edu/~policy/disruptive.pdf and the Policy on Threatening Behavior by Students found at http://web.arizona.edu/~policy/threatening.pdf

Grievance Policy:
Should a student feel he or she has been treated unfairly, there are a number of resources available. With few exceptions, students should first attempt to resolve difficulties informally by bringing those concerns directly to the person responsible for the action, or with the student's graduate advisor, Assistant Dean for Student and Alumni Affairs, department head, or the immediate supervisor of the person responsible for the action. If the problem cannot be resolved informally, the student may file a formal grievance using the Graduate College Grievance Policy found at http://grad.arizona.edu/academics/policies/academic-policies/grievance-policy

Grade Appeal Policy:
http://catalog.arizona.edu/2008%2D09/policies/gradappeal.htm

Syllabus Changes:
Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate.

Telephone Use:
Turn your cell phones to silent or vibrate in order to not disrupt the class and disturb your fellow students and professor.

SCHEDULE:
Any changes to the following schedule will be announced in lecture. You are responsible for obtaining information on any changes, even if you miss class.

Plagiarism:
What counts as plagiarism?
- Copying and pasting information from a web site or another source, and then revising it so that it sounds like your original idea.
- Doing an assignment/essay/take home test with a friend and then handing in separate assignments that contain the same ideas, language, phrases, etc.
- Quoting a passage without quotation marks or citations, so that it looks like your own.
- Paraphrasing a passage without citing it, so that it looks like your own.
- Hiring another person to do your work for you, or purchasing a paper through any of the on- or off-line sources.

Date	Topic/Lessons	Reading
Week1	Introduction and overview of Course Examples of survival data	Ch. 1; 2.1-2.6; 3.1-3.4
Week 2	Survival and hazard functions Types of censoring and truncation	4.1-4.2
Week 3	Life tables and Kaplan-Meier estimator	4.3-4.6; 5.1-5.2
Week 4	Confidence interval for survival function Estimation for left and interval censored data	7.1-7.3
Week 5	Hypothesis testing: one and two sample tests	7.4-7.8
Week 6	Cont'd two sample tests (trend, stratified, others)	Chs. 1-7
Week 7	Midterm Exam	8.1-8.2
Week 8	Spring Break (no class)	
Week 9	Introduction of proportional hazards (PH) model	8.1-8.4
Week 10	PH model: model building and estimation	8.6-8.8
Week 11	PH model: model diagnostics	11.1-11.6
Week 12	Cox PH model: extension of Cox PH model and parametric models	9.1-9.4; 12.1-12.4
Week 13	Recurrent events and Competing risk events	
Week 14	Martingale Approach	
Weeks 15 & 16	Final project presentation	