STAT 255 - Survival Analysis
Course Syllabus

Lectures: Tuesday and Thursday, 2:00-3:20, Room: MSTB 110

Discussion: Tuesday, 4:00-4:50; Room: MSTB 114

Course Web Site: Located at http://www.ics.uci.edu/~dgillen/STAT255/Statistics_255.html Electronic copies of the course handouts (lecture notes and homework assignments) as well as datasets used during the course will be posted on the web site.

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Thursday 11-12,
and by appointment

Co-requisites: Statistics 202, 211 or equivalent; or permission of instructor

Description: This course will provide an introduction to the principles and methods for the analysis of time-to-event data. This type of data occurs extensively in both observational and experimental biomedical and public health studies, as well as in industrial applications. While some theoretical statistical detail is given (at the level appropriate for a Master's student in statistics), the primary focus will be on data analysis. Problems will be motivated from an epidemiologic and clinical perspective, concentrating on the analysis of cohort data and time-to-event data from controlled clinical trials.


Recommended texts: (On reserve in Crerar library)

Software/Computing: Examples that are presented in class are primarily done using the R statistical package, and it is recommended that R be used for homework assignments and exams. R is free software that can be downloaded from the web at http://www.r-project.org/. R can be installed onto Windows, Mac, or Unix machines. The website also offers many tutorials regarding the use of R. If you wish, it is possible to use other commercially available software packages such as Splus, Stata, Matlab, or SAS.

Homework: There will be a total of 5-7 homework assignments. Assignments will typically be due 1 to 1.5 weeks from the day they are handed out.

Midterm Exam: Tentatively scheduled for Thursday, February 11th. The exam will cover material through the February 9th lecture.

Final Exam: The final exam is scheduled for Thursday, March 17th, 1:30pm-3:30pm. The final exam will be take-home and will consist of two portions. The first portion of the exam will consist of short answer questions similar to a comprehensive homework assignment. The second portion of the exam will be a complete statistical analysis and report pertaining to a particular scientific question. The final exam will be handed out on Tuesday, March 8th and due on Thursday, March 17th by 3:30pm.

Grading: Homework: 35% Midterm: 30% Final: 35%

Course Objectives: By the end of this course, the student should be able to do the following:

- Identify characteristics of survival data and problems in their correct analysis
- Define and understand the relationship between the survival function, distribution function, hazard function, relative hazard, and cumulative hazard
- Perform and interpret univariate analyses of survival data using the Kaplan-Meier estimator
- Perform and interpret two-sample analyses of survival data using common statistical procedures such as the logrank test
- Formulate research questions involving survival data as regression problems
- Fit the proportional hazards regression model to survival data and assess the scientific significance, precision, and interpretation of regression coefficients
- Fit parametric regression model to survival data and assess the scientific significance, precision, and interpretation of regression coefficients
- Use graphical and other methods to assess the adequacy of fitted models and propose alternate solutions when common assumptions are violated
- Use time-dependent covariates in the proportional hazards model and interpret the coefficients
- Understand and use methods for analyzing correlated survival data
- Interpret and critically evaluate survival analyses in biomedical or epidemiologic manuscripts
- Describe survival analysis methods and results to a non-statistical audience
- Understand the basic foundational theory of survival analysis