University of Washington Department of Biostatistics
8th Summer Institute in Statistics for Clinical and Epidemiological Research

Module 12: Survival Analysis with Emphasis on Applications to Clinical Trials

July 21 – 23, 2021

- **Instructors**
  Ying Qing Chen, PhD (Instructor), email: yqchensu@stanford.edu
  Eric R. Morenz (TA), email: emorenz@uw.edu

- **Instruction Hours**
  Lectures: 8:30am – 10:00am, 10:30am – 12:00noon
  Break: 10:00am – 10:30am

- **Course Description**
  Censored time-to-event data, where not all subjects experience the event of interest, are common in biomedical research. This module introduces some essential statistical tools for analyzing censored time-to-event data and emphasizes methods for clinical trials. The module will:

  – Introduce important functions, including survival curves, the hazard function, and the median survival time, in analyses of time-to-event data;
  – Review life-table analysis, and introduce one-sample Kaplan-Meier estimation of survival curves;
  – Introduce the two-sample log-rank test, and alternative testing procedures that weight group comparisons differently over the follow-up time interval;
  – Introduce the Cox proportional hazards model for regression analysis of the association between an explanatory variable and a censored event-data outcome;
  – Describe how information is accrued when there is group-sequential monitoring of a clinical trial, and
  – Describe power and sample size calculation for a clinical trial with censored time-to-event outcomes;
  – Discuss other topics, such as competing risks and biased sampling, arising from observational studies, if time permits.

  The course will focus on application and understanding the concepts with examples from the literature; mathematical details will be kept to a minimum. Working knowledge of basic probability and statistical concepts will be assumed.

- **Course Evaluation**
  Two problem sets, four in-class quizzes, and answer keys will be handed out for practice and self-evaluation.

- **Recommended Textbooks**
  Kleinbaum, DG & Klein, M (2012) *Survival Analysis: A Self Learning Text, 3rd Ed.* Springer.
  Hosmer, DW, Lemeshow, S & May, S (2008) *Applied Survival Analysis: Regression Modeling of Time-to-Event Data, 2nd Ed.* Wiley.

- **Course Calendar**
  - July 21: Problem Set 1 assigned; Quiz 1
  - July 22: Problem Set 2 assigned; Quizzes 2 and 3
  - July 23: Quiz 4

- **Course Outline**
  - Background
    - Brief history of survival analysis
    - Time-to-event and censoring
    - Life tables
  - Parametric Methods
    - Parameter distributions
    - Likelihood functions and maximum likelihood
  - Kaplan-Meier Curves
  - Log-Rank Tests
  - Cox Proportional Hazards Model
  - Additional Topics

- Zoom Meeting Information

Topic: SISCER 2021 Survival Analysis (Chen)
Time: July 21 – 23, 2021 08:30 AM Pacific Time (US and Canada)

Join Zoom Meeting
https://washington.zoom.us/j/98303950626?pwd=Kzl2aXU1YTlQZkNUb1Vlc2Vrb2RWZz09

Meeting ID: 983 0395 0626
Passcode: 2021072123

One tap mobile
+12063379723,,98303950626#,,,,*2021072123# US (Seattle)
+12532158782,,98303950626#,,,,*2021072123# US (Tacoma)

Dial by your location
        +1 206 337 9723 US (Seattle)
        +1 253 215 8782 US (Tacoma)
        +1 213 338 8477 US (Los Angeles)
        +1 346 248 7799 US (Houston)
        +1 602 753 0140 US (Phoenix)

+1 669 219 2599 US (San Jose)
+1 669 900 6833 US (San Jose)
+1 720 928 9299 US (Denver)
+1 971 247 1195 US (Portland)
+1 470 250 9358 US (Atlanta)
+1 470 381 2552 US (Atlanta)
+1 646 518 9805 US (New York)
+1 646 876 9923 US (New York)
+1 651 372 8299 US (Minnesota)
+1 786 635 1003 US (Miami)
+1 267 831 0333 US (Philadelphia)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)

Meeting ID: 983 0395 0626
Passcode: 2021072123
Find your local number: https://washington.zoom.us/u/aekOGUKd1X

Join by SIP
98303950626@zoomcrc.com

Join by H.323
162.255.37.11 (US West)
162.255.36.11 (US East)
213.19.144.110 (Amsterdam Netherlands)
213.244.140.110 (Germany)
103.122.166.55 (Australia Sydney)
103.122.167.55 (Australia Melbourne)
69.174.57.160 (Canada Toronto)
65.39.152.160 (Canada Vancouver)
207.226.132.110 (Japan Tokyo)
149.137.24.110 (Japan Osaka)
Meeting ID: 983 0395 0626
Passcode: 2021072123