

Biostatistics 140.641: Survival analysis

Tu, Th, 3:30-4:50PM; Room W3008

Course website: <http://www.biostat.jhsph.edu/~xli/teaching/survival/survival.html>

Lecture Instructor: Mei-Cheng Wang

Office Hours: Mon 3:00–4:00PM; Fri 3:00–4:00PM, Room E3614

Lab. Instructors: Xianbin Li; Sheng Luo

Lab. Time: To be determined.

Objective The course will introduce fundamental concepts in survival analysis. The emphasis is on statistical methods which are useful in medical follow-up studies and in general time-to-event studies.

Prerequisite Biostatistics 140.611-2 or 140.650 or equivalent. Knowledge of calculus such as differentiation and integration is required.

Requirements There will be 4 problem sets (including a computing homework) and an inclass-exam at the end of the quarter.

References

*Collett, D. “Modelling Survival Data in Medical Research”, Chapman and Hall, 1994.

**Cox, R. and Oakes, D. “Analysis of Survival Data”, Chapman and Hall, 1984.

**Kalbfleisch J. D. and Prentice, R. L. “The Statistical Analysis of Failure Time Data”, Wiley, 1980.

*Lee, E. “Statistical Methods for Survival Data Analysis”, Wadsworth, 2nd-edition, 1992.

*: Introductory; **:Advanced

SYLLABUS

1. Introduction

- Survival, hazard and cumulative hazard functions
- Definitions of (right-)censoring
- Left-censoring, Interval-censoring, Left-truncation and Right-truncation
- Weibull, log-normal, log-logistic and Gamma distributions
- Maximum likelihood estimation

2. One sample estimation

- Complete follow-up
- Incomplete follow-up
 - a. Likelihood functions
 - b. Clinical life-tables
 - c. Greenwood's formula
 - d. Kaplan-Meier estimator and its properties

3. Proportional hazards model

- Assumptions of the model
- Testing and estimation
- Computing programs and interpreting results
- Time dependent covariates

4. Two-sample testing

- Complete follow-up: Wilcoxon test
- Incomplete follow-up
 - a. Logrank test
 - b. Generalized Wilcoxon test
 - c. Comparison of different nonparametric tests

5. Truncated data

- Left truncation, prevalence sampling and length-bias
- Left truncated and right censored data
- Risk-set based methods: truncation product-limit estimator and proportional hazards models

6. Recurrent event data (only partially covered)

- Time-between-events models
- Time-to-events models