Syllabus: Survival Analysis Methods

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Class Hours: Tuesday 3:00-4:50 PM

Office Hours: Amita Manatunga, Friday 11:00–12:00 AM or by appointment, Yuxuan Chen , Tuesday, 10:00 am – 11:00 am or by appointment; Jialu Ran, Thursday, 10:00-11:00AM or by appointment.

Optional Reference Texts:

1. Cox, D.R. and Oakes, D. *Analysis of Survival Data*, Chapman & Hall, 1984;
2. Collett, D. *Modeling Survival Data in Medical Research*, Chapman & Hall, 2003.
3. Kalbfleish, J. and Prentice, R.L. *The Statistical Analysis of Failure Time Data*, 2nd Ed., Wiley, 2002.

Objectives:

1. To attain good understanding of basic concepts and standard models and methods in survival analysis;
2. To develop adequate quantitative skills to solve real-world problems related to survival outcomes;
3. To stimulate enthusiasm to foster sensible applications in public health and biomedical research.

Topics: This course will cover statistical concepts and techniques that are commonly used in the practice of survival analysis. The concepts to be introduced include survival functions, hazard rates, types of censoring and truncation. Methods of focus are life table, Kaplan-Meier and Nelson-Aalen estimates, log-rank tests, Cox regression models, and parametric regression models. Students will learn how to implement standard survival analysis methods using SAS or R and appropriately interpret results.

Course Activities:

- **Homework** will be assigned approximately once per week. It is due on the following Tuesday (before the lecture). **Late homework is not accepted**. You are expected to work independently most of the time, but learning from others with

group discussions is acceptable. You must present your work by yourself. Copying or sharing your homework with others is prohibited. You must write your own codes.

- **Group Projects** will be assigned throughout the year. You may receive 3 to 4 small projects over the semester. You are expected to participate and work actively within the group. For each group, you are supposed to submit a self evaluation of your own role. One report must be submitted from each group.
- **Midterm inclass Exam** is tentatively scheduled on October 13th, 2020(closed book, notes).
- **Final inclass Exam** is tentatively scheduled on November 24, 2020 (closed books and notes).

Honor Code:

RSPH Honor and Conduct Code found in the RSPH Catalog, as well as on the RSPH website: https://www.sph.emory.edu/rollins-life/enrollment-services/honor-code/index.html.)

LGS Honor Code Pledge found in the LGS Student Handbook, as well as on the LGS website: https://gs.emory.edu/handbook//honor-conduct-grievance/honor/index.html

Grading:

- Homework: 30%
- Midterm exam: 25%
- Group Projects: 15%
- Final Examination: 30%

Tentative Schedule of Topics and Activities:

Date	Topics or Activities
1	Introduction to survival problems (Chapter 1); Basic quantities (Sections 2.1–2.4)
2	Common models for survival data (Sections 2.5–2.6); Censoring and truncation; Likelihood construction (Section 3.1–3.5)
3	Nonparametric estimation of basic quantities I (Sections 4.1–4.4)
4	Nonparametric estimation of basic quantities II (Sections 4.5–4.6; Chapter 5)
5	Hypothesis testing I (Sections 7.1–7.4)
6	Hypothesis testing II (Sections 7.5–7.8); Sample size and power calculations
7	Cox proportional hazards model I (Sections 8.1–8.4)
8	**Midterm exam**
9	Cox proportional hazards model II; Model building (Sections 8.5–8.8)
10	Refinement of the Cox regression (Chapter 9)
11	Diagnostics of the Cox regression model (Sections 11.1– 11.6)
12	Inferences for parametric regression models (Chapter 12)
13	Additive hazards regression models (Chapter 10); Report writing;
14	Wrap up