

Advanced Survival Analysis

Lecturer : Dr. Weijing Wang

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Requirements: Students who take this course for credits include

- Ph.D. students
- MS students who have some background knowledge in survival analysis at an elementary level.

Course descriptions:

- The materials include classical topics with advanced techniques (such as counting processes) and recent research trend under each topic
- Please download the lecture notes which are available on E3 one day before the class. (the latest time: 7:00 pm on Monday)

Grading system:

- Homework: 30%
- Exam: 35%
- Project: 35%
 - Students can either analyze a real dataset using appropriate methods or review literature (usually including more than one paper) on a selected topic.
 - Oral presentation and a written report are both required. A good oral presentation should provide a clear sketch of the main ideas. A good written report not only delivers the main ideas in a systematic and logical way but also contains necessary details. They serve different purposes. The format will be provided later.

References:

- “*Survival Analysis – Techniques for Censored and Truncated Data*” by Klein and Moeschberger (Biomedical applications) Second edition, 2002
- “*The Statistical Analysis of Failure Time Data*” by Kalbfleisch and Prentice, Second edition.
- “*Counting processes and Survival Analysis*” by Fleming and Harrington

Tentative topics (I will only choose some of the topics from the list)

1. Different types of data structures (censoring, truncation)

- Censoring (right, left, interval)
- Truncation

2: Likelihood inference: parametric analysis

3: Nonparametric analysis under various data structures

4: Counting process and martingales

- Nonparametric inference – revisited

5: Multivariate survival analysis

- Frailty approach
- Copula modeling

6: Two-sample comparison

- Log-rank statistics and others

7: Regression analysis

- Proportional hazards model & AFT model
- Transformation model
- Semi-parametric linear model
- Models and inference for multivariate data

8: Competing risks & dependent censoring

- frailty approach
- copula approach
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9: Cure model

10: Recurrence events data