

Survival Analysis Spring 2023
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INSTRUCTOR: Dr. Ryan Sun (first half) & Dr. Kristofer Jennings (second half)
SCHEDULE: 10:30-11:45am, Monday/Wednesday; BSRB Schissler Library

EMAIL: rsun3@mdanderson.edu; KJennings@mdanderson.org
OFFICE HOURS: Ryan Sun: 11:45am-12:45pm Wednesday
 Kristofer Jennings: (TBA)

TEXT:

The Statistical Analysis of Failure Time Data, 2nd Ed. John D. Kalbfleisch and Ross L. Prentice, John Wiley & Sons 2002.

This book is recommended as a reference. However, the first half of the course will follow notes from the instructor's website.

PREREQUISITE:

It is expected that students possess a background in basic probability and inference, such as the material in *Statistical Inference*, 2nd Edition, Casella & Berger (2002).

COURSE OBJECTIVE: This course introduces basic components of modern survival data analysis with emphasis on application in biomedical research and public health. The R programming language will be the primary analytical tools for the course. Students are expected to gain competencies in the following areas after taking this course: (1) to have a fundamental idea on how to model censored event time data (2); to have a solid foundation in nonparametric and semiparametric methods for survival data analysis (3); to understand how to use statistical software to perform survival data analysis.

The following topics are tentatively included in the course:

- 1. Topic 1: Parametric Inference**
 - Survival Distributions
 - Hazard Functions
 - Cumulative Hazards
- 2. Topic 2: Censoring and Likelihood**
 - Likelihood Construction
 - Inference for Parametric Survival Distributions
- 3. Topic 3: Kaplan-Meier Estimator**
 - Survival Tables
 - Greenwood's Formula
 - Checking Assumptions
- 4. Topic 4: Logrank Test**
 - Stratified Logrank Test
 - Weighted Logrank Test

5. **Topic 5: Cox Regression I**
 - Proportional Hazards Model
 - Partial Likelihood
 - Inference for Regression Parameters
6. **Topic 6: Cox Regression II**
 - Examples
7. **Topic 7: Cox Regression III**
 - Stratified Cox Model
 - P+1 Groups
 - Time-Varying Covariates
 - Underlying Cumulative Hazard
8. **Topic 8: Martingales, Advanced Topics**
 - Martingales
 - Competing Risks
 - Interval Censoring

ASSIGNMENTS: There will be four-six homework assignments throughout the course. You are given one or two weeks to complete the work for each assignment. Although discussion is allowed during the work, you are **not allowed** to simply copy someone else's work and submit it as your own. Duplication of submission will result in zero credit for both the original and duplicated submissions. Substantial penalties may be imposed for a submission that is late or illegible. Submission in Latex is encouraged. The assignments are worth 40% of your total grade.

EXAMS: There will be two exams: midterm and final. Each is worth 30% of your total grade.

GRADES: We will give grades based on the percentage of points from the homework assignments and two exams (rounded to the nearest 0.1%). The following scale will be used to assign letter grades:

Percent of 400 credit points	Grade
97.5-100.0	A+
90-97.4	A
87.5-89.9	A-
85-87.4	B+
80-84.9	B
77.5-79.9	B-
75-77.4	C+
70-74.9	C
67.5-69.9	C-
60-67.4	D
<60	F

COMPLAINTS: If you have any concerns regarding any aspect of this course (content, evaluation, etc.), please come and discuss these matters with us.