M21-618 Survival Analysis (Spring 2020)

Coursemaster: Ling Chen, MSPH, PhD

Semester & time(s): First half of Spring semester; two three-hour lectures per week

Schedule: Tue and Thur 1:30-4:30

Place: MSIBS classroom, 5rd Floor (502), Becker Medical Library, 660 S. Euclid Ave

Credits: 3

Objective: This course will cover the basic applied and theoretical aspects of survival analysis techniques to analyze time-to-event data. Basic concepts will be introduced and topics include survival function, hazard function, censoring and truncation, Kaplan-Meier and Nelson-Aalen estimators, cohort life table, likelihood construction for censored and truncated data, estimating hazard and survival functions, Cox-proportional hazards (PH) model with fixed and time-dependent covariates and model selection. Additional topics will include regression diagnostics for survival models, the stratified PH model, parametric regression models and competing risk. Computer lab sessions are designed to provide intensive hands-on experience to analyze real life datasets.

Competencies / Expectations:
1. Recognize the important features of survival data, e.g. censoring and truncation.
2. Construct likelihood for survival data and conduct hypothesis testing
3. Determine the proper method in analyzing time-to-event data (e.g., parametric, semi-parametric or non-parametric method).
4. Understand the assumptions for the method chosen to analyze the survival data.
5. Perform survival analysis using SAS and interpret computer outputs.
6. Assess the quality of survival analysis conducted in published research papers.

Prerequisites: Biostat I and II, mathematical statistics (covers probabilities, distributions, likelihood, etc.), Calculus I and II and SAS programming. Or talk to the course master.

Please bring your calculator to quizzes and exams (No cell phones allowed as a calculator!).

Format: Lectures, homework, quiz and two exams

Grade Criteria:

4 homework assignments, 2 quizzes	(30%)
Midterm	(35%)
Final exam	(35%)

Textbook (Required): **Survival Analysis by John P. Klein and Melvin Moeschberger**

Date	lecture	Topic	Assignments	Lecturer
1/14	1	Survival Data and Basic Quantities	HW 1 assigned	Chen
1/16	2	Censoring and truncation, likelihood construction		Chen
1/21	3	Nonparametric estimation for right censored data	HW 1 due, HW 2 assigned	Chen
1/23	4	Univariate estimation, cohort life table, quiz #1, assign paper reading#1		Chen

1/28	5	Hypothesis testing, paper reading#1		Chen
1/30		Computer Lab #1		Chen
2/4		Midterm	HW 2 due	Chen
2/6	6	Semiparametric proportional hazards model, assign paper reading#2	HW 3 assigned	Chen
2/11	7	Semiparametric proportional hazards model, paper reading#2		Chen
2/13	8	Time-dependent covariates, Refinements of proportional hazards model, quiz #2		Chen
2/18		Computer Lab #2	HW 3 due, HW 4 assigned	Chen
2/20	9	Regression Diagnostics		Chen
2/25	10	Parametric models, power		Chen
2/27		Reading day - Review for final		
3/3		Final exam	HW 4 due	Chen

All the datasets used in the text can be found on the following website:

https://www.mcw.edu/departments/biostatistics/statistical-resources