Course Syllabus

SCHOOL OF PUBLIC HEALTH

UIC

BSTT536: Survival Time Analysis

Fall/2024

Credits: 3

Meeting Days: Mondays and Wednesdays

Meeting Time: 1:00pm-2:15pm

Meeting Place: SPHPI room 936

Instructor: Hua Yun Chen, PhD

Office Address: SPHPI room 954

Office Phone: 312-996-4762 **E-mail:** hychen@uic.edu

Office hours: 12:10-12:50pm, Mondays and Wednesdays

I. Course Description

Topics to be covered.

1. Survival data and censoring.

   Survival function, Cumulative hazard, Hazard density, Censoring mechanisms.
   Exponential model fit, Point and interval estimates of survival function based on exponential model fit.

2. Nonparametric estimation of survival functions

   Kaplan-Meier estimator of survival distribution, Estimator of the cumulative hazard function, Greenwood variance formula, Confidence interval for survival function, Median survival estimation based on Kaplan-Meier estimator or on exponential model fit

3. Comparisons of Survival functions.

   Comparison of two survival functions: Nonparametric approach: log-rank test, Wilcoxon test
   Parametric approach: Based on exponential model fit.
   Comparison of multiple survival functions.
   SAS Proc lifetest

4. Parametric regression model for survival time.

   Weibull model and other parametric model, Likelihood estimation and inference,
   Connection with two-sample and multiple sample comparisons.
   SAS Proc lifereg

5. Cox regression model for survival times

   Partial likelihood for parameter estimation and inference, Baseline hazard estimation in Cox regression model, Cox regression model with time-dependent covariates

SAS Proc phreg

6. Analysis of interval censored data.

   Parametric likelihood approach, Nonparametric likelihood, and its problems
   Connection with analysis of binary outcomes and longitudinal outcomes.

7. Survival model fitting and checking for Cox regression

   Model fitting and checking for parametric regression models

8. Sample size and power calculation for a survival study.

9. Multivariate survival time Analysis

   SAS Proc phreg and Proc NLmixed

II. Course Prerequisites

Grade of B or better in BSTT 525 and Grade of B or better in STAT 411, or consent of the instructor.

III. Course Text and Other Readings

Textbook.

Collect, D. (2015). Modelling Survival Data in Medical Research. 3rd edition. By D. Collect. CRC press.

Recommended references

Hosmer, D. W., and Lemeshow, S., and May, S. (2008). Applied Survival Analysis: Regression modeling of time to event data. John Wiley.

IV. Methods of Instruction

Lectures and discussion

V. Course Objectives

Students will learn statistical methods for analyzing survival time data in biomedical research. Those include learning the concepts of right censoring, left censoring, and interval censoring data and how to analyze data to address the issue of censoring. Students will also learn the methods for estimating survival curves and for comparing survival curves. The methods include parametric and nonparametric methods for two-sample comparison and multiple sample comparison, parametric and semi-parametric regression techniques for subpopulation comparison and prediction. Students will also learn to carry out survival time data analysis by statistical software packages and to interpret the analytical results.

VI. Course Outline/Weekly Schedule/Assessments

There will be 6 homework assignments and 2 exams. See separate file for weekly schedule.

VII. Grading

Homework: 30%, Midterm: 35%, Final: 35%.

Late home receives a maximum 80% of the normal score and makeup exam is not allowed unless under very special circumstance which are considered on a case-by-case basis.

Incomplete Grades

Incomplete (IN) may be given only if, for reasons beyond the students' control, required work has not been completed by the end of the term. University policy states that an IN must be completed by the end of the students' next registered term subsequent to that in which it was received or, if the student is not in registered, by the end of the twelve consecutive months subsequent to that in which the IN was received. If a student is requesting an incomplete, they will be required to develop a timeline to complete all incomplete work in conjunction with the faculty member.

VIII. Evaluation

The School values student feedback on course content and faculty teaching skills as an important means for improving our work. This includes mid-course evaluations which provide an opportunity for continuous course improvement during the term. Please take the time to complete both the mid-couse and end-of-term CourseEvals. In the last class session, students will have 15 minutes of class time to complete course evaluations. CourseEvals are anonymous and instructors will not receive their end-of-term CourseEvals results until after final grades have been submitted. We hope you take the time to participate in these opportunities for student feedback.

IX. The SPH Peer Support Team

The Peer Support Team, comprised of MPH students advanced in writing and quantitative methods, is dedicated to helping their fellow students succeed academically. During the fall and spring terms, the team offers individual and group sessions to help students understand public health concepts and skills, and to assist with class assignments in a relaxed and supportive environment. Peer Support Specialists work with one another and in consultation with course instructors, TAs and Office of Diversity and Inclusion staff to ensure that students at SPH have the support they need to succeed in their coursework. Services are free of charge and available to all undergraduate and graduate Public Health students. You can schedule an appointment by clicking the scheduling tab below any of the specialists found here: http://publichealth.uic.edu/diversity-and-inclusion/peer-support-team

X. Librarian Office Hours and Support

The UIC SPH has a dedicated librarian, Professor Kim Whalen, available to assist students with library research, including searching PubMed and other databases, accessing the full text of sources, navigating citation managers including Zotero, and developing systematic literature search strategies. Reach out to Prof Whalen with questions or to set up an appointment to meet in person or via Zoom. She is available at kwhale4@uic.edu and 312/355-7004. Her office is #114 within the Library of the Health Sciences.

XI. Grading Rubrics

Homework is to be submitted in the blackboard Assignment and graded using that function. Students can access the graded homework on their blackboard account. Exams are graded by hand and students can request access through the instructor.

XII. Additional SPH and Campus Policies

All previously listed SPH and Campus-specific Policies will now be housed in the AY2024-25 Academic Procedures and Policies Handbook, to be linked at the following link on or before Friday, 8/16/2024: https://publichealth.uic.edu/current-students/student-handbooks/.

For graduate students who matriculated in spring 2024 or later, this information is also available in the recently expanded, schoolwide SPH Success: https://publichealth.uic.edu/admissions-aid/sph-success/.