

Fall 2017  
Department of Statistics and Actuarial Sciences

Actuarial Science 4823A/9004A

Survival Analysis

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**Lecture:** M 2:30-4:30 pm in WSC 240  
W 3:30-4:30 pm in WSC 240

**Office Hours:** F 2:30 - 3:30pm or by appointment

**Prerequisites:** A minimum mark of 60% in Statistical Sciences 3858B

**Description:** This course is intended to provide students with an understanding of the theory and applications of survival analysis. By the end of the course, students are expected to be able to perform statistical inference for various types of survival data by using parametric, semi-parametric or nonparametric survival models.

**Main Reference Book:**

- *Statistical Models and Methods for Lifetime Data, 2<sup>nd</sup> Edition*, by Jerald F. Lawless, John Wiley & Sons, 2003.
- *The Statistical Analysis of Failure Time Data, 2<sup>nd</sup> Edition*, by John D. Kalbfleisch and Ross L. Prentice. John Wiley & Sons, 2002.

**Topics:**

1. Introduction to survival analysis.
2. Essential preliminaries: survivor function, hazard function, cumulative hazard function, density function and their relationships for both continuous and discrete survival times. Censoring and truncation.

3. Basic properties of lifetime distributions: the common lifetime distributions, how the distributions are derived in survival analysis, and their properties that are essential in choosing distributions in practice.
4. Non-parametric estimation and graphical methods: Kaplan-Meier estimator, Nelson-Aalen estimator, and their variance estimators; Log-rank test for distribution difference; Graphical methods that combining nonparametric estimation and choices of parametric models in practice.
5. Parametric survival models: statistical inference for parametric model settings.
6. Regression analysis for parametric models: goodness of fit and model selection for regression models under parametric settings.
7. Regression analysis for semi-parametric models: goodness of fit and model selection for regression models under semi-parametric settings where part of the models is left unspecified.

**Evaluation:** 20% Assignments +45% Midterms + 35 % Project

- 4 assignments: due IN CLASS on
  - Oct. 2
  - Oct. 23
  - Nov. 13
  - Dec. 4
- Two Tests: two hours, in class
  - Oct. 16
  - Nov. 27
- Project due: Dec. 8, 11:59pm.

**Note:**

- There will be no make up tests. No late assignment is allowed.
- You are allowed to discuss your assignments, but everyone has to write the assignment himself/herself. No copy is allowed.
- Final project is a group project. At most three students in each group.  
In the project report, each of you has to report your role in the project

**Calculators:** Non-programmable calculators are allowed for the tests.

**Aid Sheet:** One double sided letter size aid sheet is allowed for each test.

**Others:** Please consult <http://www.stats.uwo.ca/oldweb/ugstudies/mutual.htm> for the Department's mutual expectations of students and instructors.