STAT4170/STAT7240

Winter Term - 2016

Course Title: Lifetime Data Analysis (Survival Analysis)

CRN: 23363

Instructor: Dr. Po Yang
            Email: Po.Yang@umanitoba.ca
            Office: 346 Machray Hall
            Phone: 204-480-1821

Lecture hours and location: Wednesday and Friday: 2:30pm - 3:45pm, 452 Parker building.

Office hours: Monday and Wednesday: 10:30am-11:30am, or by appointment

Course web: All course materials are posted on the University of Manitoba Desire2Learn.

General description: An introduction to basic principles and techniques for survival analysis in biostatistics and reliability, with emphasis on both theory and applications. Topics to be covered include: censoring, survival, hazard and other functions, parametric, semi-parametric and nonparametric methods, proportional hazards regression, clinical trials. The computer software SAS will be used to analyze data.

Prerequisites: STAT 3480 and STAT 3800 (or STAT 3600). Some knowledge of calculus is also assumed.

Recommended references:

1. *Statistical methods for survival data analysis* (4th edition), E. T. Lee and J. W. Wang, John Wiley and Sons, New York, 2003.
2. *Statistical models and methods for lifetime data* (2nd edition), J. F. Lawless, John Wiley and Sons, New York, 2003.
3. *Modelling survival data in medical research* (3rd edition), David Collett, Chapman & Hall/CRC, 2003, ISBN 1584883251.

Grading:

Three Assignments   15%
Midterm Test   35%
Final Examination (2 hours)   50%
Note: 1. Students in STAT 7240 are required to do some extra work for the assignments and exams. 2. Midterm exam missed with final-exam-type excuse will transfer 35% to final-exam contribution rather than being make-up with a make-up test. 0 with no excuse.

Examinations: Both the mid-term test and final examination are closed book. A calculator is necessary. Required statistical tables are provided.

Course contents:

Module I: Basic concepts, models, functions and distributions Censoring: Types I, Type II, interval, random, etc. Continuous and discrete models: survival function, (cumulative) hazard function, mean residual lifetime function, mean and median survival times. Distributions: exponential, Weibull, Gamma, normal, etc.

Module II: Nonparametric methods: one-sample and multiple-sample, product-limit (Kaplan-Meier) and actuarial (life-table) estimators, Greenwood's formula, confidence band, (Mantel-Haenszel) log-rank test, Wilcoxon test, etc.

Module III: Semi-parametric regression: Cox's proportional hazards, partial likelihood, global and local tests, estimation, etc. Model building, variable selections, and diagnostics for PH assumptions.

Module IV: Parametric methods: MLE for Type I/II censoring. Exponential and Weibull distributions. Other distributions: normal, log-normal, Gamma, etc. (time permitting)

Module V: Optional topics (time permitting): Parametric regression, accelerated failure time models, competing risks models, time-dependent covariates, stratified models, recurrent events, sample size determination, etc.

Academic Integrity Policy:

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Links to resources that describe academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation) can be found at:

http://www.umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html

Typical penalties imposed within the Faculty of Science for academic dishonesty are also described.