STAT4170/STAT7240, CRN 26358
Lifetime Data Analysis (Survival Analysis)
Winter Term, 2014-2015

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

Lecture hours and location: Tuesdays and Thursdays 11:30am-12:45pm, 316 Machray Hall.

Office hours: Tuesdays and Thursdays 1:30pm-2:30pm, 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* (3rd 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* (2nd 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 and a formula sheet are provided. The test/examination questions will range from computations to concepts and proofs.

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, Greenwoods formula, confidence band, (Mantel-Haenszel) log-rank test, Wilcoxon test, etc.

Module III: Semi-parametric regression – Coxs 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:

PLEASE REFER TO THE UNIVERSITY OF MANITOBA GENERAL ACADEMIC REGULATIONS (AVAILABLE ONLINE VIA U OF M HOMEPAGE) REGARDING ACADEMIC INTEGRITY, EXAMINATION POLICIES, ETC.

SECTION 5: Academic Evaluation

5.2.9 Examinations: Personations

"A student who arranges for another individual to undertake or write any nature of examination for and on his/her behalf, as well as the individual who undertakes or writes the examination, will be subject to discipline under the universitys Student Discipline Bylaw, which could lead to suspension or expulsion from the university. In addition, the Canadian Criminal Code treats the personation of a candidate at a competitive or qualifying examination held at a university as an offence punishable by summary conviction. Section 362 of the code provides:

Personation at Examination

362. Everyone who falsely, with intent to gain advantage for him/herself or some other person, personates a candidate at a competitive or qualifying examination held under the authority of law or in connection with a university, college or school or who knowingly avails him/herself of the results of such personation is guilty of an offence punishable on summary conviction. 1953- 54,c.51, s.347.

Both the personator and the individual who avails him/herself of the personation could be found guilty. Summary conviction could result in a fine being levied or up to two years of imprisonment."

SECTION 8: Academic Integrity

8.1 Plagiarism and Cheating

"Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room (e.g., crib notes, pagers or cell phones). Exam cheating can also include exam impersonation. (Please see Section 5.2.9 on Exam Personation). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

To plagiarize is to take ideas or words of another person and pass them off as ones own. In short, it is stealing something intangible rather than an object. Plagiarism applies to any written work, in traditional or electronic format, as well as orally or verbally presented work. Obviously it is not necessary to state the source of well known or easily verifiable facts, but students are expected to appropriately acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to diagrams, statistical tables and the like, as well as to written material, and materials or information from Internet sources.

To provide adequate and correct documentation is not only an indication of academic honesty but is also a courtesy which enables the reader to consult these sources with ease. Failure to provide appropriate citations constitutes plagiarism. It will also be considered plagiarism and/or cheating if a student submits a term paper written in whole or in part by someone other than him/herself, or copies the answer or answers of another student in any test, examination, or take-home assignment.

Working with other students on assignments, laboratory work, take-home tests, or on-line tests, when this is not permitted by the instructor, can constitute Inappropriate Collaboration and may be subject to penalty under the Student Discipline By-Law. An assignment which is prepared and submitted for one course should not be used for a different course. This is called duplicate submission and represents a form of cheating because course requirements are expected to be fulfilled through original work for each course.

When in doubt about any practice, ask your professor or instructor. The Student Advocacy Office, 519 University Centre, 474-7423, is a resource available to students dealing with Academic Integrity matters."