STAT 4100

Statistical Inference I
Theory of Point Estimation

Fall Term, 2009-2010

Calender Description

Introduction to methods of estimation, including asymptotic and Bayesian methods. Not to be held with the former STAT 4140.

Prerequisite STAT 3800 (or the former STAT 3600 or 005.360).

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Office hours: Mondays & Wednesdays, 9:00 a.m. to 10:30 a.m. or by appointment.

Mark Breakdown

Assignments (four assignments, each 5%)	20%
Two Midterm Tests (In class, October 23, November, 23, 2009)	30%
Final Examination (150 minutes, time and placed to be announced)	50%

Assignments

Assignments are due at the start of class (time will be announced). Assignments submitted late will be severely penalized. Assignments submitted after the solutions are posted or after the graded assignments are return to students will not be marked and receive a grade of 0. Obviously, exceptions can be made to the above policy if special/exceptional circumstances warrant them (e.g., serious illness).

Tests

The midterm tests and the final examination are closed book. Statistical tables will be provided if required. A non-programmable calculator is necessary (graphing calculators are not permitted). However, other electronic devices, such as cell phones and MP3, are strictly prohibited.

There will be NO make-up midterm tests. Students who miss the midterm tests with legitimate reasons will have the midterm weights added to the final examination.

Recommended Text Books

(i) **Probability and Statistical Inference**
by: Nitis Mukhopadhyay
Marcel Dekker
ISBN 0-8247-0319-0
2000.

(ii) **Statistical Inference** (Second Edition)
by G. Casella and R.L. Berger
Duxbury/Thomson Learning
ISBN 0-534-24312-6
2002.

(iii) **Introduction to Mathematical Inference** (Sixth Edition)
by R.V. Hogg, J.W. McKean and A.T. Craig
Pearson/Prentice Hall
ISBN 0-13-008507-3
2005.

Voluntary Withdrawal

Note that the voluntary withdrawal date is November 18, 2009 (by which time you will have received your marks for the test and several assignments).

Academic Dishonesty

It is important that you understand what constitutes academic dishonesty and that you are familiar with the very serious consequences. Links to resources that that describe academic dishonesty (including plagiarism, cheating, inappropriate collaboration and examination impersonation) can be found at:
`http://www.umanitoba.ca/faculties/science/student/webdisciplinedocuments.html`
or through the Faculty of Science home page at:
`http://www.umanitoba.ca/faculties/science`
Typical penalties imposed within the Faculty of Science for academic dishonesty are also described.

2009–2010 REGISTRATION ADVISORY

Important Note from the Dean of Science:

It is your responsibility to ensure that you are entitled to be registered in this course. This means that you have:

- the appropriate prerequisites, as noted in the calendar description, or have permission from the instructor to waive these prerequisites;

- not previously taken, or are concurrently registered in, this course and another that has been identified as "not to be held with" in the course description. For example, BIOL 1000 cannot be held for credit with BIOL 1020.

The registration system may have allowed you to register in this course, but it is your responsibility to check. If you are not entitled to be in this course, you will be withdrawn, or the course may not be used in your degree program. There will be no fee adjustment. This is not appealable. Please be sure to read the course description for this and every course in which you are registered.

Tentative Topics

1) Statistical models

Basic concepts including parametric, nan-parameteric and semi-parameteric models.

Exponential family

Location-scale family

Introduction to various approaches of statistical inference

2) Methods of data reduction

The Sufficiency Principle
(sufficiency, minimal sufficiency, completeness, ancillarity, Information)

The Equivariance Principle

3) Methods for finding and evaluating point estimators

Moments and maximum likelihood methods

Bayesian method

M-estimators

Unbiasedness, Mean Square Error

Asymptotic evaluation

Minimum variance unbiased estimators

Loss function optimality

4) Methods for finding and evaluating interval estimators

Confidence interval based on pivotal quantities

Shortest, unbiased and approximate maximum likelihood confidence intervals

Bayesian confidence intervals

Methods for evaluating interval estimators including size and coverage probability