



# ACMA 445

## Loss Models: Estimation and Selection

Spring 2007  
Day Course

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca

Instructor: [Dr. Yi Lu](#)

### Prerequisite:

ACMA 320

### Required Text:

*Loss Models: From Data to Decisions, 2nd Edition*, 2004, S.A.Klugman, H.H. Panjer and G.E. Willmot; Publisher: Wiley

### References:

*ACTEX Study Manual for SOA Exam C and CAS Exam 4, Fall 2005 Edition*, by S.A.Broverman, Publisher: ACTEX

*Survival Models and Their Estimation, 3rd Edition*, by D. London, Publisher: ACTEX

### Calendar Description:

Quality of an estimator: unbiasedness, asymptotic unbiasedness, consistency, means squared error, uniform minimum variance. Confidence interval. Tests of hypotheses. Estimation for complete data. Estimation for grouped data. Estimation for modified data: Kaplan-Meier estimator, variances and confidence intervals of the empirical estimator, kernel density estimator. Parameter estimation. Variance of the estimators and confidence intervals. Model selection: graphical procedures, goodness-of-fit test, likelihood ratio test. Interpolation and smoothing. Covers part of the syllabus for Exam C of the Society of Actuaries and Exam 4 of the Casualty Actuarial Society.

### Outline:

This course covers the fundamentals of actuarial loss models. The topics covered correspond to chapters 9-15 of the required text. They include the following:

1. Review of mathematical statistics: Point estimation, interval estimation, tests of hypotheses.
2. Estimation for complete data: Empirical distributions for complete, individual data and grouped data, Study design.
3. Estimation for modified data: Point estimation, Mean, variance, and interval estimation, kernel density models, approximations for large data sets.
4. Parameter estimation: Method of moments and percentile matching, maximum likelihood estimation, variance and interval estimation, Bayesian estimation, estimation for discrete distribution.
5. Model selection: Representations of the data and model, hypothesis tests, two types of selection criteria.
6. Interpolation and smoothing: Polynomial interpolation and smoothing, cubic spline interpolation, approximating functions with splines, extrapolating with splines.

### Grading Scheme:

Assignments – 10%

Midterm 1 – 35%

Midterm 2 – 35%

Project – 20% (Presentation 5%, Report 15%)

*Grading is subject to change.*

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

Revised January 2007