UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Actuarial Science 531 Loss Distributions and Their Estimation

(see Course Descriptions for the applicable academic year: http://www.ucalgary.ca/pubs/calendar/)

Main Reference Text: **"**Loss Models," by Klugman, Panjer, and Willmot, fourth edition, 2012.
Additional Text:

Syllabus

Topics

Chapter 10: Review of mathematical statistics

Chapter 11: Estimation for complete date

Chapter 12: Estimation for modified data

Chapter 13: Frequentist estimation

Chapter 14: Frequentist estimation for discrete distribution (excluding 14.5)

Chapter 15: Bayesian estimation

Chapter 20: Simulation

It is intended that this course should cover a portion of the syllabus for that part of the professional actuarial examination concerned with the Construction and Evaluation of Actuarial Models. Currently, this corresponds to most of the material listed above from Chapters 10-15 and 20 that is on the syllabus for the Society of Actuaries Exam C. This course syllabus should be updated as needed, with this objective in mind.

ACSC 531: Loss Models Course outcomes:

By the end of this course, students will be able to:

1. Construct empirical models for failure time and loss distributions using the Kalpan-Meyer, Nelson- Aalen and kernel density estimators. Estimate the variance of these estimators and construct confidence intervals for failure times and loss distributions.
2. Construct estimators for decrement probabilities using parametric and non-parametric methods, for both individual and grouped data. Compute the variance of these estimators.
3. Estimate the parameters for failure time and loss distributions using the following parametric techniques: method of moments, percentile matching, maximum likelihood and Bayesian estimation.
4. Estimate the parameters of failure time and loss distributions with censored and/or truncated data using the method of moments and the maximum likelihood estimation technique. Estimate the variance of estimators and construct confidence intervals for the model parameters.
5. Determine the acceptability of a fitted model and/or compare models using graphical approaches and several statistical tests, such as the likelihood ratio, Kolmogorov-Smirnov, Anderson-Darling and the Chi-Square goodness-of-fit tests.
6. Simulate from various discrete and continuous random variables and apply these simulation techniques in the context of actuarial models.

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