Actuarial Science 511	Introduction to Generalized Linear Models for Actuaries

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

Course Description

This course presents the general linear model (GLM) methodology and some of its applications of interest to actuarial analysts. Main topics include: description of insurance data, response distributions, exponential family responses and estimation, generalized linear models, models for count data, categorical responses, and continuous responses. Additional topics may be covered, time permitting, depending on class interest. Applications featured will involve examples from some or all of personal injury insurance, vehicle insurance, diabetes deaths, the Human Mortality Database, third party claims, degree of vehicle crash. Applications from other fields may also feature in the course depending on class interest. The use of standard software (e.g. R, SAS) for fitting GLMs will be discussed.

Syllabus

This course presents students with an introduction to the generalized linear model (GLM) methodology and its application in the context of insurance data. The syllabus of this course should cover portions of material on the GLM found in the exams / modules of the professional actuarial societies (e.g. CAS Exam S, SOA Applications of Statistical Techniques Module). Topics to be covered include (e.g. as listed in Chapters 1-8 of de Jong and Heller, 2008):

- Insurance data
- Response distributions
- Exponential family responses and estimation
- Linear modeling *(may be assigned reading)*
- Generalized linear models
- Models for count data
- Categorical responses
- Continuous responses

Additional topics may be covered as time permits, and class interest warrants.

Software used to fit GLMs (e.g. R, SAS) will be a part of this course.

Prerequisite

STAT 323;
STAT 429 is a recommended co-requisite or pre-requisite.

Textbook

An Introduction to Generalized Linear Models, 3rd Edition, Dobson and Barnett.

Generalized Linear Models for Insurance Data, de Jong and Heller.

Non-Life Insurance Pricing with Generalized Linear Models, Ohlsson and Johansson.

Course Outcomes

1. By the end of the course, students will be expected to be able to use the computing environment R to analyze data.

2. By the end of the course, students will be expected to be able to explain the differences between ordinary least squares and a generalized linear model (GLM).

3. By the end of the course, students will be expected to be able to use software to estimate the parameters of a GLM.

4. By the end of the course, students will be expected to be able to select an appropriate GLM for a given data set, including variable selection and diagnostics.

5. By the end of the course, students will be expected to be able to use GLMs to perform classification ratemaking.

6. By the end of the course, students will be expected to be able to explain how the generalized linear mixed model incorporates credibility.

7. By the end of the course, students will be expected to be able to use various models, including GLMs, to estimate variability in reserve estimates.

8. By the end of the course, students will be expected to be able to apply Bayesian and bootstrap methods to estimate variability in reserve estimates.

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08:15:17 (new course)
RS
08:25:17 (housekeeping)
DPMS