STAT 538 - Generalized Linear Models

Term 1, 2004-2005

Monday and Wednesday 13:30-15:00, LSK 301

3 credits

Instructor: Paul Gustafson (*gustaf@stat.ubc.ca*), LSK 326. Office hour: Mon. 12:00-13:00.

E-mail list: I will distribute course announcements and information via e-mail. Send me an e-mail and I'll add you to the course list. If it becomes useful I'll make a webpage for the course.

Prerequisite: Open to any interested graduate students in the Department of Statistics. Graduate students from other departments are welcome provided they have sufficient statistical and mathematical backgrounds. Such students should consult the instructor about suitability.

Textbook: An Introduction to Generalized Linear Models, Second Edition, by Annette J. Dobson. Chapman and Hall / CRC Press, 2001.

Description: Generalized Linear Models (GLMs) extend much of the 'niceness' of linear models to situations where the response variable is not continuous. Consequently these models are popular for analysis in the common scenarios of response variables which are binary, categorical, counts, proportions, or directions. GLMs have become a big part of the 'statistical toolbox' for biostatistical work, and are widely used in other areas as well.

The first part of the course (likely 7-8 weeks) will be a core introduction to GLMs, including quick review of linear models, the fundamental formulation of GLMs, discussion of link functions, iterative least-squares algorithms, deviance and asymptotic theory, residuals, quasi-likelihood, and quadratic variance functions. A wide range of GLM applications will be discussed.

The second part of the course (likely 5-6 weeks) will deal with more specialized and research-oriented topics. Examples of such topics would be (i) generalized linear mixed models (GLMMs), (ii) methods for estimating (rather than assuming) the link function, and (iii) Bayesian fitting of GLMs (the instructor is incapable of teaching a course without some Bayesian content!).

Coursework will include a mix of data-analytic and empirical exercises (i.e., using the computer) and more theoretical exercises. Students will need to develop (or already have) some computing skills with the R (or S-Plus) software package.

Other References:

Generalized Linear Models, Second Edition. McCullagh and Nelder. Chapman and Hall / CRC Press, 1989.

Categorical Data Analysis, Second Edition. Agresti. Wiley, 2002.

The Theory of Dispersion Models. Jorgensen. Chapman and Hall / CRC Press, 1997.

Modern Applied Statistics with S. Venables and Ripley. Springer, 2002.