

School of Mathematics

Statistics 451 — Generalised Linear Models

2001–02

(JS/SS Mathematics, Two-subject moderatorship, JS/SS MSISS (elective))

Lecturer: Prof. J. Haslett & Dr. C. Walsh

Requirements/prerequisites:

Duration: 21 weeks

Number of lectures per week:

Assessment:

End-of-year Examination:

Description: This course is concerned with the use of linear statistical models for the analysis of data from a variety of sources. Such models include as special cases the classical linear models which underly regression and analysis of variance. In these, the random variation is modelled by the familiar Normal distribution, the expected value of which is some linear function of the explanatory variables. But the framework is much wider, and also includes the Binomial and Poisson models random variation, as well as many others, and allows the expected value to be modelled as some function of a linear combination of the explanatory variables. A most important special case is logistic regression.

Applications will include many areas of science and of business. The course will address both the theory of such models and the application to data analysis using modern statistical software. It will be presumed that students will have a general familiarity with the elementary mathematics of discrete and continuous univariate probability distributions, and with the concepts of least squares and maximum likelihood. The first week will be used as a refresher of these concepts. Students will be expected to be able to use standard computer packages for data analysis.

The course will follow Dobson and will cover the topics of:

Model fitting

The exponential family of distributions and generalized linear models

Estimation

Inference

Multiple regression

Analysis of variance and covariance

Binary variables and logistic regression

Contingency tables and log-linear models

References:

1. Dobson, A.J., *An Introduction to Generalized Linear Models*, Chapman and Hall, 1990.
2. McCullagh, P. and Nelder, J.A., *Generalised Linear Models*, Chapman and Hall, 1989.