

UNIVERSITY COLLEGE OF THE FRASER VALLEY

COURSE INFORMATION

DEPARTMENT: Mathematics

DATE: May 1994

Math 402
NAME & NUMBER OF COURSE

Generalised linear models and survival analysis
DESCRIPTIVE TITLE

3
UCFV CREDIT

CATALOGUE DESCRIPTION: The application of the methods of the linear model analysis developed in Math 302 to non-normal data. This includes, in particular, the analysis of contingency tables by log-linear models, the analysis of incidence data by Poisson models, the analysis of case-control data by logistic models, the analysis of matched case-control data by logistic models, the analysis of matched case-control data by conditional logistic regression, and the analysis of survival data adjusting for covariates and by the use of Cox's proportional hazard models.

COURSE PREREQUISITES: Math 302, and Math 270 or permission of the department.

COURSE COREQUISITES:

HOURS PER TERM FOR EACH STUDENT	Lecture	45 hrs	Student Directed	
	Laboratory	30 hrs	Learning	hrs
	Seminar	hrs	Other - specify:	
	Field Experience	hrs		hrs
			TOTAL	75 HRS

**UCFV CREDIT
TRANSFER**

**UCFV CREDIT
NON-TRANSFER**

NON-CREDIT

TRANSFER STATUS (Equivalent, Unassigned, Other Details)

UBC credits

SFU credits

UVIC units

Other

Math Curriculum Committee
COURSE DESIGNER

J.D. TUNSTALL Ph.D.
DEAN OF ACADEMIC STUDIES

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COURSES FOR WHICH THIS IS A PREREQUISITE:
RELATED COURSES

Upper level Statistics courses, esp. Math 302, Math 370.

TEXTBOOKS, REFERENCES, MATERIALS (List reading resources elsewhere)**TEXTS:** TBA**Basic references:**McCullagh, P. and Nelder, J.A. *Generalized Linear Models* (Second edition). Chapman and Hall (1989).Dobson, A.J. (1983) *An Introduction to statistical modelling*. Chapman and Hall (1983).Kalbfleisch, J.D. and Prentice, R.L. *The statistical analysis of failure time data*. John Wiley (1980).**OBJECTIVES:**

1. Understand how a sound grasp of the univariate linear model can be extended by the use of the Nelder-Wedderburn methods to a large variety of exponential models with a scale factor.
2. Be conversant with the commonly used generalized linear model applications and how to apply them to data sets using statistical software.
3. Become acquainted with the notions underlying the published analyses of incidence and survival data, especially the 'lack of memory' of the Poisson model and of the Cox conditional likelihood.

METHODS:**STUDENT EVALUATION PROCEDURE:**

Assignments	20%
In-class tests	40%
Final Examination	40%

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COURSE CONTENT

Dilution assays, the complementary log-log transformation. Probit analysis. Logit models for proportions. Inverse polynomials.

Weighted regression, deviance, the link function, exponential models with a scale factor, the Nelder-Wedderburn scoring method of iteratively reweighted least squares with an iteratively adjusted dependent variable.

Special cases with discussion:

Exponential failure with covariates, simple survival. Poisson counts with covariates, application to incidence data, repeated counts of a single observation.

Analysis of multi-way contingency tables by log-linear models.

Logistic regression.

Conditional logistic regression; application to matched case-control data.

Models with constant coefficient of variation, the gamma distribution.

The inverse-Gaussian distribution, applications to length-of-stay data.

Weibull survival with covariates.

Extreme value distribution with covariates.

Cox's proportional-hazard model, Cox's logistic model for survival. Stratification.

Examples of joint modelling of mean and dispersion (as time allows).