



# STAT 402

## Generalized Linear and Nonlinear Modelling

Spring 2007  
Day Course

Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca

Instructor: [Dr. Rick Routledge](#)

### Prerequisite:

STAT 350

### Textbook:

*An Introduction to Generalized Linear Models* (2nd edition) by: A.J.Dobson; publisher: Chapman & Hall.

### Calendar Description:

A skills oriented unified approach to a broad array of non-linear regression modelling methods including classical regression, logistic regression, probit analysis, dilution assay, frequency count analysis, ordinal-type responses, and survival data.

### Outline:

NOTE: This course extends the concepts, methods and approach of STAT 302-3 to cover a wide variety of types of outcome data. It employs a modern unified approach to a broad array of nonlinear regression problems.

1. Brief Review of Fundamental background.
2. Overview: Empty model, link function, simple examples of structuring a mean value vector with link function and design matrix, and of structuring variance with a variance function; iterated reweighted least squares estimation.
3. Examples from exponential-type likelihood models: Normal, including classical linear regression and other links; Poisson, including log-linear regression; Binomial, including logit, probit, and dilution assay. Examples allowing overdispersion.
4. Other Examples.
5. Inference: The variance-covariance matrix of the estimated regression vector and confidence intervals for linear predictors, fitted values, other relevant estimated quantities; comparative evaluation of models, deviance, Pearson statistic, residuals.
6. Logistic Regression.
7. Contingency tables and log-linear models.
8. Ordinal-type outcome: Proportional odds model, proportional hazards model.
9. Survival data.  
(or as much of the above as time permits)

### Grading Scheme:

Assignments – 15%

Project – 10%

Midterm – 30%

\*Final – 45%

\*Students must achieve 50% on the final exam in order pass the course.

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*Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.*

Revised January 2007