523: GENERALIZED LINEAR MODELS

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Office Hours : Tuesday 11:00-12:30
Thursday 11:000-12:30
Other appointments available if necessary

Textbooks : *Categorical Data Analysis* (2nd Ed) by A. Agresti,
Generalized Linear Models (2nd Ed) by P. McCullagh & J.A. Nelder,

Evaluation : Assignments (15 %), Mid Term (25 %), Final (60 %)
See p. 2 for full details

TARGET SYLLABUS

1 Review of the linear model
- 1.1 least-squares estimation
- 1.2 distribution of estimators
- 1.3 hypothesis testing
- 1.4 aliasing and multicollinearity
- 1.5 interactions
- 1.6 response transformations
- 1.7 residuals

2 Generalized linear models (GLMs)
- 2.1 exponential families
- 2.2 link functions
- 2.3 maximum likelihood
- 2.4 iteratively weighted least-squares
- 2.5 quadratic algorithms for maximum likelihood
- 2.6 asymptotic distribution of maximum likelihood estimators
- 2.7 deviance and likelihood ratio tests

3 Models for count data
- 3.1 Poisson regression and log-linear models
- 3.2 Implementation in R
- 3.3 goodness-of-fit tests
- 3.4 contingency table analysis
- 3.5 structured log-linear models: independence and symmetry
- 3.6 underdispersion and overdispersion

4 Models for binomial and multinomial data
- 4.1 binomial and logistic regression
- 4.2 logistic regression as a special case of log-linear modelling
- 4.3 2×2 tables and case-control designs
- 4.4 exact tests
- 4.5 multinomial responses
- 4.6 model checking

5 Special topics
- 5.1 gamma regression
- 5.2 quasi-likelihood and generalized estimating equations
- 5.3 estimation of the link function

EVALUATION: DETAILS

Please note that the method of evaluation for this class will be **on the following basis only**:

Coursework Assignments	Four Assignments Beginning Tuesday 24th January 2012
Mid-Term	1.5 hours Thursday 16th February 2012 In class Closed book
Final	3 hours Closed book

Final mark for course‡: the larger of

$$15\ \%\ \text{Coursework} + 25\ \%\ \text{Mid-Term} + 60\ \%\ \text{Final}$$

and

$$15\ \%\ \text{Coursework} + 85\ \%\ \text{Final}$$

NOTES:

‡ There will no opportunity for a make-up Mid-Term if this examination is missed, and no make-up work in place of any aspect of the course assessment. Assignments handed in late will be subject to penalties of up to 100 %

ACADEMIC INTEGRITY

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see

`http://www.mcgill.ca/integrity/`

for more information).

- In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.
- In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

David A. Stephens.
17th December 2010.