

Prefix, Number and Name of Course: ACM 660 Logistic Regression

Credit Hours: 1

In Class Instructional Hours: 1

Labs: 0

Field Work: 0

Catalogue Description:

Prerequisite: MAT 202 or equivalent

Comparison of linear and logistic regression, multiple logistic regression, regression diagnostics, indicator variables, multicollinearity, confounding and interaction, model selection, maximum likelihood techniques, polychotomous logistic regression.

Reasons for addition:

To create a one-semester-hour module for the graduate Professional Applied and Computational Mathematics program where students will formulate and solve real life problems in various settings using logistic regression analysis, a popular statistical tool which replaces the ordinary least squares regression as the data analytic tool of choice when the dependent variable is dichotomous or polychotomous.

Student Learning Outcomes: Students will:	Content Reference	Assessments
1. fit dichotomous and polychotomous logistic regression models to real-life data and test for the appropriateness of the models.	I, II. A, B, E, G, III	Individual homework assignments, group work, examinations and computer projects.
2. compare and contrast confounders and effect modifiers.	II. C, D, III	Individual homework assignments, group work, examinations and computer projects.
3. analyze the maximum likelihood techniques and their use in statistical inferences.	II. F, III	Individual homework assignments, group work, examinations and computer projects.
4. analyze the problem of multicollinearity and the sequential methods for model selection.	II. A-G, III	Individual homework assignments, group work, examinations and computer projects.
5. examine and experiment on how statistical software can be used in the field.	III.	Individual homework assignments, group work, examinations and computer projects.

Course Content:

- I. Introduction to logistic regression

- A. Linear regression and the logistic regression model
 - B. The logic of logistic regression
 - C. Interpreting the logistic regression coefficients
 - D. Estimation and model fit - evaluating the logistic regression model
- II. Multiple logistic regression
- A. Categorical or indicator variables
 - B. Logistic regression diagnostics - analysis of residuals, collinearity
 - C. Confounders and effect modifiers
 - D. Assessing multiplicative interaction
 - E. Modeling strategy guidelines
 - F. Maximum likelihood techniques
 - G. Polychotomous logistic regression
 - H. Analysis of matched data (optional)
- III. Use of statistical software

Scholarships in the Field:

Allison, P. D., *Logistic Regression using the SAS system: theory and application*, N.C: SAS Institute, 1999.

Christensen, R., *Log-linear Models and Logistic Regression*, New York: Springer, 1997.

Clogg, C. C. and Shihadeh, E. S., *Statistical Models for Ordinal Variables*, CA: Sage, 2001.

Cox, D. R. and Snell, E. J., *The Analysis of Binary Data*, 2nd ed., CA: Sage, 1994.

Hosmer, D. W. and Lemeshow, S., *Applied Logistic Regression*, 2nd ed. New York: Wiley, 2000.

Jaccard, J., *Interaction Effects in Logistic Regression*, CA: Sage, 2001.

Kleinbaum, D. G., *Logistic Regression: a self-learning text*, 2nd ed., New York: Springer, 2002 .

Kutner, M. H., *Logistic Regression Modeling*, Department of Biostatistics and Epidemiology Cleveland Clinic 1998.

Long, J. S., *Regression Models for Categorical and Limited Dependent Variables*, CA: Sage, 1997.

Menard, S. W., *Applied Logistic Regression Analysis*, 2nd ed., CA: Sage, 2002.

O'Connell, A. A., *Logistic Regression Models for Ordinal Response Variables*, CA: Sage, 2006.

Pampel, F. C., *Logistic Regression: a primer*, CA: Sage, 2000.

Periodicals:

Annals of Applied Statistics

Annals of Mathematical Statistics

Annals of Statistics

Biometrics

Biometrika

Communications in Statistics

Demography

International Statistical Review

Journal of the American Statistical Association

Journal of Applied Statistics

Journal of Applied Statistical Science

Journal of Statistical Computation and Simulation

Journal of the Royal Statistical Society

Life-time Data Analysis

Scandinavian Journal of Statistics

Statistics in Medicine

Statistical Methods in Medical Research

Technometrics

The American Statistician

Electronic and/or Audiovisual Resources:

Electronic Journal of Statistics

Link to electronic journals web site (<http://www.e-journals.org/>)