Department of Public Health Sciences and Epidemiology
Course # PH 656
Course Title Biostatistics II
Spring, 2007

Meeting Place: Biomedical Tower, room T211
Time: Tuesday, Thursday 10:30-11:45 AM
Instructor Information:

Name John Grove
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Office Hours: Tuesday, Thursday 1:00-2:00 PM.

Course Description: Use of two way analysis of variance (ANOVA) and contrasts, applications of the Poisson distribution, multiple linear regression modeling, analysis of covariance, basic path analysis, multiple logistic regression modeling, generalized estimating equations-based regression models when the observations are not independent.

This course will use chapters 1-5 plus chapter 10 of the textbook. Additional chapters will be used in the course PH747. Basic programming skills using the statistical package SAS will be covered.

Sequence of Course topics:

1. The Poisson distribution and its applications. Chi-square test of whether an observed sample of counts is consistent with having come from a Poisson distribution. Text: 11.1-11.5; class handouts.
2. Orthogonal contrasts in ANOVA. Text: 12.8-12.9; class handouts.
3. Two Way ANOVA and interactions between factors. Text: chapter 14; 15.7-15.15; 16.1-16.6; class handouts.

*** Exam 1 *** (approximately February 13, 2007)

4. Introduction to simultaneous equations for regression analysis and matrix algebra. Appendix to chapter 17; class handouts;
5. Introduction to multiple linear regression. Chapter 17; class handouts.

*** Exam 2 *** (approximately March 15, 2007)

6. Introduction to SAS - descriptive statistics and multiple regression.
7. Analysis of Variance and Covariance by multiple regression - creation of design variables for contrasts.
8. Testing for interactions among the X variables with cross products.
9. Interpreting multiple regression models when X variables are confounded.
10. Introduction to Path Analysis.
11. Logistic regression - analyzing proportions and modeling odds ratios. Text: 20.7.
12. Exponential regression – analyzing “count data”.
13. Adjusting standard errors of regression models when data occur in blocks of correlated observations through generalized estimating equations (GEE).

PH656 Course Learning Objectives:

1. Compute Pearson chi-square tests for whether a theoretical distribution is consistent with an observed set of data.
2. Apply the properties of the Poisson distribution to data based on counts to obtain confidence intervals for the population mean.
3. Compute significance tests of contrasts in one way ANOVA using a hand calculator.
4. Compute tests based on two way ANOVA for study designs both without and with replicated observations.
5. Compute a multiple linear regression model using a hand calculator to obtain estimates of the regression coefficients, their standard errors, the ANOVA for multiple regression, and the coefficient of determination.
6. Obtain and interpret multiple linear regression model values from computer program output using the statistical package SAS.
7. Write computer code to create design variables for a class variable using SAS and be able to interpret the regression coefficients from different types of coding.
8. Perform analysis of covariance using SAS.
9. Create variables to test for the presence of interactions between two independent variables in multiple regression models and interpret their values.
10. Estimate the parameters and interpret the results from simple path analysis models and partition potential causation into direct and indirect effects.
11. Obtain and interpret multiple logistic regression model values from computer program output using the statistical package SAS and perform likelihood ratio tests for sets of independent variables.
12. Compute and interpret the results for exponential regression models.
13. Use the method of generalized estimating equations to estimate regression parameters when the data occur in clusters of correlated observations for linear, logistic, and exponential regression models.

Required Text: *Statistical Methods, 8th edition* by G.W. Snedecor and W.G. Cochran.

Course Policies:

- Books and personal notes can be consulted during exams.
- Students must have a calculator with basic statistical functions. Most of the assigned problems will require using a computer, either from the PC lab at the School of Public Health, or a terminal at a UH facility (or use your own PC, if you have one). *The student is responsible for working and handing in assigned problems on time*
- Plagiarism will result in a failing ("F") grade for the assignment. Students should familiarize themselves with the university of Hawai'i Student Conduct Code.
- The course grade is based on the total number of points achieved over the two exams and the class assignments.

Grading System:

Grading Points	Total Points	Percentage
Two mid-term examinations	200	67%
Class assignments	100	33%

Course Grade: 98-100% = A+; 95-97=A; 90-94=A-; 87-89% = B+; 84-86=B;
80-83=B-; 77-79=C+; 70-76=C; 66-69% = C-;
63-65% = D+; 60-62%=D; 55-59%=D-; <55% = F.

Core and Specialization Competencies Addressed:

AS1 Define a public health problem.

AS2 Determine appropriate use of data and statistical methods.

AS3 Collect and summarize data relevant to an issue.

AS4 Evaluate the quality and comparability of data and identify gaps in data sources.

AS6 Identify research designs used in public health, including advantages and flaws of specific designs, and determine designs appropriate to specific needs.

E5 Apply appropriate statistical tests for parametric and non-parametric settings and identify advanced statistical methods for analyzing both nominal and continuous data, for both univariate and multivariate applications.

PHS4 Use advanced computer skills as appropriate.