DEPARTMENT: Biostatistics and Bioinformatics

COURSE NUMBER: BIOS 526  SECTION NUMBER:  SEMESTER: FALL 20XX

CREDIT HOURS: 3

COURSE TITLE: Modern Regression Analysis

INSTRUCTOR NAME  Howard H. Chang, PhD

INSTRUCTOR CONTACT INFORMATION

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OFFICE HOURS  Mondays 1:000 – 2:00pm or by appointment.

BRIEF COURSE DESCRIPTION

This course introduces students to modern regression techniques commonly used in analyzing public health data. Topics include: (1) parametric and non-parametric methods for modeling non-linear relationships; (2) methods for modeling longitudinal and multilevel data that account for within group correlation; (3) Bayesian regression modeling; and (4) methods for multivariate outcomes. Prerequisites: BIOS 507 or instructor’s permission.

LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES

- Use analytic reasoning and quantitative methods to address questions in public health and population-based research
- Perform the appropriate statistical analyses of study data
- Use computer statistical software for both data management and data analyses
- Assist in the interpretation of study results
- Interpret statistical results of biomedical studies effectively
- Apply existing statistical theory and methods to a broad range of medical or public health problems
- Conduct appropriate statistical analyses for a broad range of applications
- Communicate the results of statistical studies both orally and in writing to senior statisticians and other investigators
LIST LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

By the end of the course, students will be able to:
1. Translate subject-area scientific questions into statistical models.
2. Identify and model non-linear functional relationships in regression analysis.
3. Use generalized linear model to analyze binary, counts, or non-Gaussian continuous outcomes while accounting for different variance components.
4. Apply marginal and random effect models to multilevel and longitudinal observations.
5. Interpret parameter estimates from a multilevel model, as well as the associated assumptions.
6. Estimate and interpret results from regression model under a Bayesian framework.
7. Gain sufficient understanding of the methods to conduct future independent research to examine specific analytical or methodological problems.

The statistical software R and WinBUGS will be used for computing.

Suggested Textbooks
Data Analysis Using Regression and Multilevel/Hierarchical Models (2007) by A. Gelman and J Hill

EVALUATION

Homework (30%)
Participation (10%)
Paper Critique (20%)
Final project proposal (5%)
Final project write-up (35%)

ACADEMIC HONOR CODE
The RSPH requires that all material submitted by a student in fulfilling his or her academic course of study must be the original work of the student.