Course Descriptions – Advanced Quantitative Courses

NOTE: Some courses may require Instructor Consent.

BCHS 3002: **Health Survey Methods**

- **PREREQUISITES**: None
- **OFFERED**: Every Spring

Introduces techniques for the collection of health data through survey methods.

BCHS 3015: **Community Mapping and Introductory Spatial Analysis**

- **PREREQUISITES**: None
- **OFFERED**: Every Fall

This course provides an introduction to the use of spatial data in public health. The two main goals are (1) to familiarize students with the use of geographic data in public health research and practice; and (2) to introduce basic spatial analytic skills applied to geographic and spatial data. Students will be taught how to use geographic information systems (GIS) to inform both community practice and research. They will learn how to create, manage, and analyze geographic data and gain hands-on experience applying these techniques to research questions. No previous knowledge of mapping or GIS is assumed. One lecture and one lab per week.

BIOST 2016: **Sampling Design and Analysis**

- **PREREQUISITES**: BIOST 2011 or BIOST 2039 or BIOST 2041; PROG: Graduate School of Public Health
- **OFFERED**: Every Fall

This is an applied statistical methods course designed to provide students with a working knowledge of introductory and intermediate-level sample designs and associated methods of statistical analysis along with a basic understanding of the theoretical underpinnings. Emphasis is placed on sampling human populations in large communities. Students will also learn statistical software used in survey data analysis, including sample selection and survey procedures in the STATA software package. Lecture topics include: simple probability samples, stratified sampling, ratio and regression estimation, cluster sampling, sampling with unequal probabilities, variance estimation and weighting in complex surveys, two-phase sampling, estimating population size and estimation of rare populations and small areas. The course will consist of one weekly 2-hour lecture and one class devoted to student presentations related to a term project assigned at midterm.

BIOST 2046: Analysis of Cohort Studies

- **PREREQUISITES**: BIOST 2042 and BIOST 2049
- **OFFERED**: Every Fall **NOTE: This course is no longer offered.**

This introductory applied course in statistical modeling focuses on maximum likelihood and related regression methods for the analysis of cohort data. Topics include generalized linear models, generalized estimating equations, and generalized linear mixed models. The course emphasizes logistic and poisson regression, and discrete survival models with time-dependent covariates. Students analyze several cohort data sets, assess the adequacy of their models, and interpret their results.

BIOST 2050: Longitudinal and Clustered Data Analysis

- **PREREQUISITES**: BIOST 2049; PROG: Graduate School of Public Health
- **OFFERED**: Every Fall

This introductory course in statistical modeling is intended for MS students in biostatistics and PhD students in biostatistics or epidemiology in their second year of graduate work. This course may be thought of as the third methods course in Biostatistics following BIOST 2041/2039 and BIOST 2049. The course focuses on regression methods for the analysis of longitudinal or more generally clustered data with emphasis on generalized estimating equation. The course objectives are to introduce generalized estimating equations (GEEs), mixed models, and generalized linear mixed models from an applied perspective to analyze longitudinal and clustered data, to understand the justification and applicability of standard procedures to standard problems, including model interpretation and assessment of model adequacy.

BIOST 2062: Clinical Trials: Methods and Practice

- **PREREQUISITES**: BIOST 2039 and BIOST 2093 PLAN: Biostatistics (MS or PhD)
- **OFFERED**: Every Spring

The course lectures integrate web-based material covering fundamental concepts in the design and conduct of modern clinical trials. Topics include: experimental designs, interim monitoring, analysis methods for comparative clinical trials, ethical, organizational, and practical considerations of design, case studies, and international guidelines for publication of trials in major journals, and meta-analyses.

BIOST 2066: **Applied Survival Analysis: Methods and Practice**

- **PREREQUISITES**: BIOST 2049; PLAN: Biostatistics (PhD or MS)
- **OFFERED**: Every Fall

This course covers fundamental concepts and methods important for analysis of datasets where the outcome is the time to an event of interest, such as death, disease occurrence or disease progression. Topics include: basic methods for summarizing and presenting time-to-event data in tabular form and graphically as life tables, non-parametric statistical techniques for testing hypotheses comparing life tables for two or more groups; approaches to fitting the semi-parametric Cox proportional hazard model and other commonly used parametric models that incorporate study co-variables, methods for assessing goodness-of-fit of the models, and sample size considerations. In addition to didactic lectures, there are group projects that involve analysis of datasets and presentation of analytic reports in the classroom.

BIOST 2086: **Applied Mixed Models Analysis**

- **PREREQUISITES**: BIOST 2083
- **OFFERED**: Every Spring

Mixed model analysis provides a new approach to modeling which allows one to relax the usual independence assumptions and take into account complicated data structures. This course will consider all types of mixed models into a general framework and consider the practical implications of their use. Topics will include; normal mixed models, generalized mixed models, and mixed models for categorical data, repeated measures data analysis and cross-over trials with mixed models. Software for fitting mixed models will be discussed.

PSYED 3408: **Hierarchical Linear Modeling**

- **PREREQUISITES**: PSYED 2410 or PSYED 3410
- **OFFERED**: Every Spring

This course is on hierarchical models for continuous and discrete outcomes. Hierarchical models are used when the units of observation are grouped within clusters. Observations in a cluster typically are not mutually independent for given covariate values as required by conventional linear and logistic regression models. Longitudinal or repeated measures data can also be thought of as clustered data with measurement occasions clustered within subjects. The focus of the course is on hierarchical linear models and their assumptions, as well as practical aspects of developing models to address research questions and interpreting the findings.

PSYED 3417: **Structural Equation Modeling**

- **PREREQUISITES**: PSYED 2410 or PSYED 3410
- **OFFERED**: Every Fall **NOTE: This course is currently not being offered. Please contact the PSYED Department psyed@pitt.edu for details on the next term the course will be offered.**

This course will introduce structural equation modeling (SEM). Some fundamental materials necessary for SEM will be reviewed; i.e. Matrix algebra, covariance algebra, multiple regression; and factor analysis. SEM is a family of techniques. Some of the different SEM techniques that will be discussed include path analysis, confirmatory factor analysis, general SEM, and mediation/moderation models. Advance SEM techniques will also be discussed, e.g. Mean and covariance SEM, latent growth curve models, multi-sample/multi-group SEM, dealing with missing and non-normal data, and mixture modeling.