

Biostatistics 612: Intermediate Statistical Analysis II

- Instructor:** T. Mark Beasley, Ph.D.
RPHB 309-E
205-975-4957
MBeasley@uab.edu
- Website:** <http://www.soph.uab.edu/Statgenetics/People/MBeasley/Courses/BST612.htm>
- Prerequisites:** Biostatistics 611; permission of instructor
- Target audience:** Students in MSPH in Clinical Research, other physicians, nurses, and health professionals; PhD students in other SOPH Departments
- Introduction:** The course will offer intermediate-level instruction in the principles of biostatistics focusing on statistical modeling approaches to the analysis of continuous, categorical, and survival data.
- Objectives:** Students are taught to intermediate-level basic analysis methods focusing on regression modeling including the links between regression and analysis of variance (parameterization), multiple regression, indicator variables, use of contrasts, multiple comparison procedures and regression diagnostics. The second half of the course will generalize these modeling concepts to different types of outcome data including categorical outcomes (i.e., logistics and log-linear modeling) and survival outcomes (i.e., proportional hazards analysis). Students are taught to conduct the relevant analysis using current software such as SAS, SPSS, and JMP.
- Format:** Faculty will present material in didactic sessions; students will be responsible for exercises and critical readings, and analysis using computer systems.
- Evaluation:** Midterm and Final examinations; Review of publications; Homeworks
- Credit hours:** 3
- Texts:** W.W. Daniel: Biostatistics – A Foundation for Analysis in the Health Sciences. Wiley

Disability Student Services

Any student with a disability that may need accommodations in order to successfully complete all requirements for this course should visit the Office of Disability Support Services, located in Room 516 of the Hill University Center (205-934-4205). This office is responsible for registering students and ensuring the University's compliance with Section 504 of the Rehabilitation Act. Once registered, this office will then inform faculty members of all courses in which the student is enrolled, of the student's status, and the specific nature of any accommodations required. Any student requiring such accommodation should discuss this with the course master and assure that the appropriate correspondence is sent from the Office of Disability Support Services.

Syllabus and Proposed Timeline

Weeks 1 - 2

Simple linear regression

- Model description with assumptions
- Least square criterion and estimates
- Likelihood based inference
- Inference for model parameters
- Inference on mean response
- Prediction of single response
- Matrix formulation

Week 3-4

Residual Analysis – Diagnostics

- Normality and homoscedasticity
- Autocorrelation
- Outliers and influential observations

Homework #1

Weeks 5-8

Multiple linear regression

- Interaction
- Polynomial regression
- Indicator variables, coding, reparameterization
- ANOVA models
- Parallel regression lines, slope shifters (ANCOVA models)
- Model comparison, General F test

Homework #2

Week 9

Variable selection

- Stepwise regression
- R^2 , adjusted R^2 , MSE, C_p , Press statistic,

Week 10

Diagnostics in multiple regression

- Lack-of-fit test
- Residual analysis
- Collinearity
- Outliers and influence statistics
- Variance inflation factor

MIDTERM ASSIGNMENT

First review/critique of Published material due

Weeks 11-13

Logistic regression

Logit model, odds ratio

Model fitting

Matched case-control study

Cumulative logit models

Diagnostics

Homework #4

Weeks 13-14

Introduction to Survival Analysis

Kaplan-Meier (product limit) techniques

Tests for differences between survival curves (log-rank test, Wilcoxon Test)

Week 15 Second review/critique of Published material due FINAL ASSIGNMENT

Course Work and Evaluation

- ◆ Homework #1 (100 points)
- ◆ Homework #2 (100 points)
- ◆ MIDTERM EXAMINATION (200 points)
- ◆ First Review/Critique of Published Material (50 points)
- ◆ Homework #4 (100 points)
- ◆ Second Review/Critique of Published Material (50 points)
- ◆ FINAL EXAMINATION (200 points)

Grading

A = 90% of total points

B = 80% of total points

C = 65% of total points

F < 65% of total points