

**INDIANA UNIVERSITY FAIRBANK SCHOOL OF PUBLIC HEALTH
DEPARTMENT of BIOSTATISTICS
Fall, 2017**

COURSE TITLE: Biostatistics Method 1-Linear Models in Public Health
COURSE NUMBER: B571
DATE: Tuesday & Thursday, 3:30-5:20 pm
LOCATION: RG5000
FACULTY: **Ziyue Liu**, Ph.D.
Associate Professor, Department of Biostatistics
410 W. 10th Street, Suite 3000, Indianapolis, IN 46202
Tel.: 278-6734, E-mail: ziliu@iu.edu
Office hours: Thursday, 2:00-3:00pm or by appointment

PREREQUISITE: B551 or B651, or Equivalent

COURSE DESCRIPTION

This course introduces some basic designs of experiment and analysis tools for outcome data of continuous variable, such as Analysis of Variance (ANOVA), Analysis of Covariance and Linear Regression Analysis. SAS programming language will be the primary statistical analytical tool for the course. Throughout the semester, applications of these statistical methods on biomedical studies will be emphasized with focus on modeling data and interpreting analytical results.

MS PROGRAM COMPETENCIES ADDRESSED IN THIS COURSE

The students are expected to gain competencies in the following areas after taking this course:

1. demonstrate a broad knowledge and understanding of current statistical theory, methods and practice in continuous data with applications to the health sciences
2. develop computer programs for the management and analysis of data sets
3. develop statistical designs and implement analyses for health science investigations
4. communicate key statistical principles effectively to health professionals
5. prepare reports and publications resulting from health science studies

LEARNING OBJECTIVES

Upon successful completion of the course, students will be able to

- learn fundamental statistical methodology for the analysis of continuous data through theoretical development and examples
- understand the practical applicability and limitations of the statistical methods
- select appropriate statistical methods for data analysis
- perform analysis using SAS statistical software packages
- communicate analysis results with short written reports summarizing the research questions of interest, the available data, statistical methods applied, and subsequent conclusions

REQUIRED OR SUGGESTED TEXT AND/OR READINGS

The textbook is "Applied Linear Statistical Models" by Kutner, Nachtsheim, Neter and Li, 5th Edition (2005, McGraw-Hill/Irwin).

EVALUATION AND GRADING SCALE

Percent of final grade:
 Homework 50%
 Mid-term examination 25%
 Project 25%
 Total 100%

The final letter grade will be assigned as follows:

97%-100%:	A+	73%-76%:	C
93%-96%	A	70%-72%:	C-
90%-92%:	A-	67%-69%:	D+
87%-89%:	B+	63%-66%:	D
83%-86%:	B	60%-62%:	D
80%-82%:	B-	< 60%:	F
77%-79%:	C+		

ATTENDANCE

Attendance is mandatory. Each student assumes responsibility for mastery of the material. Attendance to in-class examinations is also mandatory. Make-up examinations will be granted only on a case-by-case basis. Students are responsible to hand in homework on time in class. Substantial penalties may be imposed for the submission that is late.

STUDENTS WITH DISABILITIES

Students needing accommodations because of disability will need to register with Adaptive Educational Services (AES) and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in CA 001E and you can reach the office staff by calling 274-3241.

STUDENT COURSE EVALUATION

Fairbank School of Public Health evaluates all courses. Student course evaluations will be conducted in a manner that maintains the integrity of the process and the anonymity of respondents.

ACADEMIC INTEGRITY

Academic and personal misconduct by students in this class are defined and dealt with according to the procedures in the Student Misconduct section of the IUPUI [Code of Student Rights](#).

CLASS SCHEDULE

Date	Lecture	Topic
Aug 22	Lecture 01	Fundamentals of Biostatistics, Part I
Aug 24	Lecture 02	Fundamentals of Biostatistics, Part II, Introduction to SAS
Aug 29	Lecture 03	One way analysis of variance (ANOVA), Part I
Aug 31	Lecture 04	One way analysis of variance (ANOVA), Part II, SAS ANOVA
Sep 5	Lecture 05	Two-way analysis of variance (ANOVA), Part I
Sep 7	Lecture 06	Two-way analysis of variance (ANOVA), Part II, SAS ANOVA
Sep 12	Lecture 07	Simple linear regressions, Part I
Sep 15	Lecture 08	Simple linear regressions, Part II Association models, SAS Proc Reg
Sep 19	Lecture 09	Simple linear regressions, Part III Review of basic linear algebra, I
Sep 21	Lecture 10	Simple linear regressions, Part IV Review of basic linear algebra, II, Matrix formulation of least squares
Sep 26	Lecture 11	Simple linear regressions, Part VI Model diagnostics, I
Sep 28	Lecture 12	Simple linear regressions, Part VII Model diagnostics, II SAS: regression diagnostics
Oct 3	Lecture 13	Multiple linear regressions, Part I Multiple linear model Statistical inference in multiple regression
Oct 5	Lecture 14	Multiple linear regressions, Part II Statistical inference in multiple regression, continued Multiple association model
Oct 10	Lecture 15	Distribution theory, SAS: multiple linear regression
Oct 12	Lecture 16	Multiple linear regressions, Part III Categorical independent variable General linear models
Oct 17	Fall break: no class	
Oct 19	Lecture 17	Multiple linear regressions, Part IV SAS: Proc GLM
Oct 24	Midterm	
Oct 26	Lecture 18	Confounding and interaction SAS: confounding and interaction
Oct 31	Lecture 19	More ANOVA models
Nov 2	Lecture 20	Analysis of covariance (ANCOVA)
Nov 7	Lecture 21	More on theory
Nov 9	Lecture 22	Weighted least squares (WLS)
Nov 14	Lecture 23	Polynomial regression analysis
Nov 16	Lecture 24	Beyond linear regression models, Part I nonlinear regressions
Nov 21	Lecture 25	Beyond linear regression models, Part II nonparametric regressions SAS: nonlinear and nonparametric regression
Nov 23	Thanksgiving: no class	
Nov 28	Lecture 26	Model diagnostics for multiple regressions
Nov 30	Lecture 27	Model selection: Part I SAS Proc Reg for model selection
Dec 5	Lecture 28	Model selection: Part II SAS Proc GLMSELECT for model selection
Dec 7	Final Project Due	