

Course Title: Biostatistical Methods for Clinical Research II
Course Number: Biostatistics 208
Winter 2019

A. Objectives

This is a second course in statistics, covering multi-predictor methods, including linear and logistic multiple regression. Emphasis is the practical and proper use of statistical methodology and its interpretation. The statistics package Stata (version 15) will be used throughout the course.

At the end of the course, students will be able to:

- To identify appropriate analyses for continuous and binary outcomes observed in clinical and epidemiological research studies;
- To apply and interpret regression models to address confounding, mediation and interaction;
- To specify and select a set of variables suitable for causal inference and prediction applications
- To perform basic model assessment for evidence of lack of fit.

B. Prerequisites

Designing Clinical Research (Epi 202), Biostatistics 200 or Biostatistics 183 and possession of a M.D., Ph.D., D.D.S. or Pharm.D. or equivalent doctoral degree. Exceptions to these prerequisites may be made with the consent of Dr. Shiboski, space permitting.

C. Faculty

Course Director: Steve Shiboski
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Lab Instructor: Li Zhang
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TAs: Chloe Eng, Kristina Van Dang

D. Format

- 1. Lectures:** Tuesdays 10:30 to 12:00, Mission Hall (MH) 1400
- 2. Labs:** Thursdays 10:30 to 12:00, MH 2106
- 3. HW Review:** Tuesday 12-1pm, MH 1400: (Dates: 1/29/19, 2/12/19, 2/26/19, 3/12/19)
- 4. Final Exam:** Handed out Tuesday 3/12/19, and due on Friday 3/22/19

E. Course CLE web site: <https://courses.ucsf.edu/course/view.php?id=5473>

F. Textbook

Linear, Logistic, Survival, and Repeated Measures Models by Vittinghoff, Glidden, Shiboski and McCulloch (*Second Edition*), Springer 2012. Referred to as “VGSM” in course syllabus.

G. Grading

Grades will be based on 4 homework assignments (70%) and a final exam (30%). Homework is due prior to class; assignments should be submitted to the course web site (link above) by 10:30 AM on the day they are due. Late work will not be accepted.

H. Syllabus

Date/Time	Faculty	Title/Content	Reading & Assignment
1/8/19	Shiboski	Overview & Intro. to Linear Regression <i>Overview of regression; linear regression intro.</i>	Chap. 2, Section 3.3, VGSM Assignment: Homework #1 Due Date: 01/29/19
1/15/19	Shiboski	Linear Regression for Multiple Predictors <i>Linear regression with categorical and/or continuous predictors</i>	Sections 4.1-4.2, VGSM
1/22/19	Shiboski	Categorical Predictors <i>F tests, tests for trend, introduction to confounding adjustment in multi predictor models</i>	Section 4.3-4.4, VGSM
1/29/19	Shiboski	Confounding and Mediation <i>Confounding, mediation and causal inference</i>	Sections 4.4-4.5, VGSM Assignment: Homework #2 Due Date: 02/12/19
2/5/19	Shiboski	Interaction <i>Conceptual introduction, product terms, testing for interaction, <code>lincom</code> statements</i>	Section 4.6, VGSM
2/12/19	Shiboski	Model Diagnostics <i>Linearity, normality, constant variance, influential points</i>	Section 4.7, VGSM Assignment: Homework #3 Due Date: 02/26/19
2/19/19	Shiboski	Predictor Selection <i>Causal diagrams, three inferential goals; number of predictors, collinearity</i>	Chapter 10, VGSM
2/26/19	Shiboski	Binary Outcome Data <i>Contingency tables; binary outcomes; measures of association; logistic model</i>	Section 3.4, VGSM Section 5.1, VGSM Assignment: Homework #4 Due Date: 03/12/19
3/5/19	Shiboski	Multiple Logistic Regression <i>Multiple logistic regression; confounding; interaction, causal inference</i>	Section 5.2.1-5.2.4, VGSM
3/12/19	Shiboski	Prediction and Model Diagnostics <i>Prediction; model assessment; outliers; goodness of fit</i>	Chapter 5.2.5-5.2.6 & Chapter 5.4, VGSM Assignment: Final Exam Due Date: 03/22/19
3/19/19	Shiboski	Case Control Studies, Alternate Models <i>Case-control studies; conditional logistic regression; alternate binary regression models</i>	Chapter 5.3 & 5.5 VGSM