

Course Title: Biostatistical Methods for Clinical Research II
Course Number: Biostatistics 208
Winter 2021

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 15/16) 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 <stephen.shiboski@ucsf.edu>

Lab Instructor: Li Zhang <li.zhang@ucsf.edu>

TAs: Janet Chu <Janet.Chu@ucsf.edu>
Caitlin Turner <Caitlin.Turner@ucsf.edu>

D. Format

1. **Lectures:** Tuesdays 10:30 to 12:00
2. **Labs:** Thursdays 10:30 to 12:00
3. **HW Review:** Tuesday 12-1pm, MH 1400: (Dates: 1/26/21, 2/9/21, 2/23/21, 3/9/21)
4. **Final Exam:** Distributed Tuesday 3/9/21, and due on Friday 3/19/21

E. Course CLE web site: <https://courses.ucsf.edu/course/view.php?id=7780>

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
1/5/21	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: 01/26/21
1/12/21	Shiboski	Linear Regression for Multiple Predictors <i>Linear regression with categorical and/or continuous predictors</i>	Sections 4.1-4.2, VGSM
1/19/21	Shiboski	Categorical Predictors <i>F tests, tests for trend, introduction to confounding adjustment in multi predictor models</i>	Section 4.3-4.4, VGSM
1/26/21	Shiboski	Confounding and Mediation <i>Confounding, mediation and causal inference</i>	Sections 4.4-4.5, VGSM Assignment: Homework #2 Due Date: 02/9/21
2/2/21	Shiboski	Interaction <i>Conceptual introduction, product terms, testing for interaction, <i>lincom</i> statements</i>	Section 4.6, VGSM
2/9/21	Shiboski	Model Diagnostics <i>Linearity, normality, constant variance, influential points</i>	Section 4.7, VGSM Assignment: Homework #3 Due Date: 02/23/21
2/16/21	Shiboski	Predictor Selection <i>Causal diagrams, three inferential goals; number of predictors, collinearity</i>	Chapter 10, VGSM
2/23/21	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: 03/9/21
3/2/21	Shiboski	Multiple Logistic Regression <i>Multiple logistic regression; confounding; interaction, causal inference</i>	Section 5.2.1-5.2.4, VGSM
3/9/21	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: 03/19/21
3/16/21	Shiboski	Case Control Studies, Alternate Models <i>Case-control studies; conditional logistic regression; alternate binary regression models</i>	Chapter 5.3 & 5.5 VGSM