Biostatistics 650: Applied Statistics I: Linear Regression
Fall 2016

Instructor: Brisa N. Sánchez
Office: SPH II, M4164
Phone: 734-763-2451
e-mail: brisa@umich.edu
Office Hours: TBD

Lecture: Monday/Wednesday 1:10–3:00pm, Room 1690 in SPH I Tower
NOTE: No class Oct. 17 (Fall Study Break)

Canvas website: https://umich.instructure.com/

Grading:
Homework: Approx. 10 assignments (15%)
Quizes: Unannounced (10%)
Exam 1: Wednesday, Oct. 12, 1:10–3:00pm (25%)
Exam 2: Monday, Nov. 21, 1:10–3:00pm (20%)
Final exam: Wednesday, Dec. 21, 1:30pm–3:30pm (30%)

Text (required):
Introduction to Linear Regression Analysis, 5th Edition
Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
Wiley (2012)
ISBN-10: 0470542810

Software for class materials: SAS

Prerequisites: Concurrent enrollment in Biostatistics 601 or equivalent
Two semesters of Calculus
One semester of Linear Algebra (including Matrix Algebra)

Course Description: This is the first course in applied statistics for both incoming MS, MPH and PhD students. It is taught at the MS level. Both theoretical and applied aspects of linear regression modeling will be covered in this course. However, the emphasis will be on applications: model building, model refinement, model diagnostics, hypothesis testing, parameter interpretation and scientific interpretation of results. Students are expected to use SAS (or R), when necessary, for homework assignments. Note that while R is an option to use for homework, the class exercises will be demonstrated with SAS. Topics to be covered include simple linear regression, multiple regression, analysis of variance, residual and influence diagnostics, variable transformations, multicollinearity, model selection and validation.
Competencies covered in this course:

Core Competencies:

1. Describe the roles biostatistics serves in the discipline of public health. (partially fulfilled)

2. Describe basic concepts of probability, random variation, and commonly used statistical probability distributions. (partially fulfilled)

3. Describe preferred methodological alternatives to commonly used statistical methods when assumptions are not met. (partially fulfilled)

4. Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions. (partially fulfilled)

5. Apply descriptive techniques commonly used to summarize public health data. (partially fulfilled)

6. Apply common statistical methods for inference. (partially fulfilled)

7. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question. (partially fulfilled)

8. Apply basic informatics techniques with vital statistics and public health records in the description of public health characteristics and in public health research and evaluation. (partially fulfilled)

9. Interpret results of statistical analyses found in public health studies. (partially fulfilled)

Biostatistics:

1. Develop knowledge to communicate and collaborate effectively with scientists in a variety of health-related disciplines to which biostatistics are applied (e.g. public health, medicine, genetics, biology; psychology; economics; management and policy). (partially fulfilled)

2. Become well-versed in the application of core statistical techniques (biostatistical inference, linear regression, generalized linear models, analysis of variance (ANOVA), linear mixed models) and 4-5 selected statistical specialization techniques. (partially fulfilled)

3. Select appropriate techniques and apply them to the processing of data from health studies. (partially fulfilled)

4. Interpret the results of statistical analysis and convert them into a language understandable to the broad statistical community. (partially fulfilled)

5. Develop written and oral presentation skills and other scientific reporting skills, based on statistical analyses for public health, medical and basic scientists and educated lay audiences. (partially fulfilled)
**Academic Integrity:** The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School.

Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student’s own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books or notes has been approved by an instructor, is a violation of the standard of academic conduct (Standard of Academic Conduct, University of Michigan School of Public Health).

**Diversity, Equity and Inclusion:** The faculty of the School of Public Health is committed to creating classroom environments that are supportive of diversity, equity and inclusion. At SPH, our mission to promote population health worldwide is inseparable from our aim to develop more effective and socially just systems for creating and disseminating knowledge. As part of this, we recognize the historical and contemporary expressions of social discrimination, and seek to promote and extend opportunities for members of all groups. We commit to developing the institutional mechanisms and norms necessary to promote the values of diversity, equity, and inclusion, both inside and outside our classrooms, and that abide by UM policies and procedures available at http://diversity.umich.edu.