

Biostatistics 310 – Biostatistics for the Health Sciences

Course Syllabus

Fall 2019

(Last modified 9/13/19)

Prerequisites: College algebra (MATH 111) or higher

Credits: 4, graded

Structure: 3 lectures/week (50 min); 1 discussion section/week (50 min)

Time: Lecture: 11:30-12:20 MWF, Health Sciences

Discussion: AA: W 12:30-1:20

AB: W 3:30-4:20

AC: Th 10:30-11:20

AD: F 8:30-9:20

Instructor: Lloyd Mancl, Research Associate Professor of Oral Health Sciences
Adjunct Research Associate Professor of Biostatistics
D-585, Health Sciences Building
206-616-5315
Please use Canvas (Avoid using my work email, lman@uw.edu)

Teaching Assistants: To be determined

TA office hours will be held in the Health Sciences library, near the computer classrooms

Course Description: The objective of this biostatistics course is to provide students with an understanding of basic concepts of data analysis and statistical inference in the medical and health sciences. The major areas covered are:

- Data description and exploratory data analysis used in health-related journals
- Design of medical and health studies
- Screening tests for disease
- Role of statistical inference in public health and medical studies
- Statistical methods for evaluating the association of factors with health outcomes

The course will make use of case studies and examples drawn from the biomedical and health sciences literature; many of these examples will have been covered in the popular press and may be familiar to students. Each case study will be used to motivate learning basic statistical ideas in the areas outlined above. Presentation of concepts will be emphasized and students will not be expected to do extensive analyses of data themselves.

Learning Objectives: Upon completion of the course, students should be able to:

- Interpret graphical displays and numerical summaries for both quantitative and categorical data that are relevant to medical and health sciences studies

- Interpret key measures of bivariate association (e.g. correlation, relative risk, odds ratio, risk difference) for relating factors to health outcomes
- Explain the difference between observational and experimental studies such as clinical trials
- Explain the difference between random and opportunistic sampling for health surveys
- Identify and describe study designs that are commonly used in medical and health studies, including designed experiments, surveys, cohort studies, and case-control studies
- Identify potential sources of bias and variability associated with a given study design
- Explain the difference between a sample and a population
- Recognize and explain the concepts of confounding and effect modification and how they affect our ability to determine causes of disease and measure the effectiveness of interventions to improve health
- Define sensitivity, specificity and predictive values in the context of a screening test for a disease
- Explain the logic of hypothesis testing and interpret p-values
- Translate medical/health questions into appropriate null and alternative hypotheses
- Explain and interpret confidence intervals
- Be able to choose an appropriate statistical test (e.g. z-test, t-test, chi-square test) to compare two samples and describe the assumptions underlying the use of these tests
- Describe the assumptions underlying simple linear regression and be able to interpret a regression model in the context of health outcomes.
- Use simple linear regression model to make predictions
- Critique the use of statistical methods in medical and health studies

Textbook (recommended): Sullivan, L. Essentials of biostatistics for the health sciences, 3rd edition, 2018. ISBN-13: 978-1449623944

Additional textbooks will be on reserve in the Health Sciences Library, and several recommended eBooks will be given on the course webpage.

Web site: Homework assignments and other course materials will be posted on the course website on Canvas (canvas.uw.edu).

Lecture Notes: The lecture notes will also be posted on the website.

Discussion Board: A discussion board is available through the Canvas website. Any student in the class may post and reply to this board. Please use the discussions to post questions and post replies to your classmates' questions. The instructor and TAs will monitor the discussions.

Homework: Homework assignments will be posted on the Canvas website and should be completed in a Word or .pdf format document and submitted electronically to the Canvas website by the due date. Late homework will not be accepted. You may discuss the homework problems with fellow students (it is encouraged) but the final version you hand in should reflect your own interpretation and understanding. The TAs will grade the assignments and provide feedback. Your lowest homework score will not contribute towards your final grade for the class.

Term Paper: You will write a short (up to 3 pages, double-spaced, Times 11 font) paper evaluating an article that has been published in the popular press that describes the results of a scientific study. The assignment consists of a draft paper, review of a peer's draft paper, and a final paper. The criteria for

evaluating articles will be described in discussion section. Further details on this assignment will be provided.

Exams: There will be two 50 minute mid-terms and a final exam (see schedule for dates). You can bring one page (2-sides) of notes to each midterm and three pages to the final. The exams will require no more than basic arithmetic that you can do in your head or on scratch paper. If you want, then it is okay to bring a calculator but it cannot be a cell-phone or wireless device. Use of any electronic device with communication ability is not allowed during exams.

Class participation: Starting in the 2nd week, we will be using the Poll Everywhere audience response system (<https://itconnect.uw.edu/learn/tools/polleverywhere/>) in class. Please go to the site, click on “Poll Takers: Set Up Your Account and Log In”, and set up your account if you do not already have one. Please note that for your Poll Everywhere account to be maintained and integrated with Canvas, the email address you supply Canvas must be your UW email address. To receive full credit for class participation, you can miss participating in about 15-20% of class activities (e.g. for Fall 2018 4 out of 23 activities), and otherwise partial credit will be given based on the number of completed activities.

Discussion Section: Discussion sections will consist of group activities and review of class material. For each discussion, you will be required to hand in a brief assignment (credit/no credit) at the end of the discussion. Your discussion section participation grade will be based on completion of these assignments. To receive full credit for discussion section participation, you can miss participating in at most one of the discussions, and otherwise partial credit will be given based on the number of completed assignments.

Background Survey: You will receive one point towards your course grade by completing a background survey during the first week of the course.

Grading: Numerical grades will be based on the following:

- Midterm 1: 15%
- Midterm 2: 15%
- Final: 30%
- Homework: 14%
- Term paper: 10%
- Class participation: 8%
- Discussion section participation: 7%
- Background survey: 1%

Final course grades will be based on a curve approximately following the guidelines at <http://depts.washington.edu/grading/practices/guidelines.html>. In the past, the median grade for Biostatistics 310 has been about 3.1. Every class is different, so this median is an estimate only.

Access and Accommodations: Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental

health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious Accommodations: Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](#). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](#).

Classroom Climate: The UW School of Public Health seeks to ensure all students are fully included in each course. We strive to create an environment that reflects community and mutual caring. We encourage students with concerns about classroom climate to talk to your instructor, your advisor, a member of the departmental or SPH Diversity Committee and/or the program director. DCinfo@uw.edu is a resource for students with classroom climate concerns.

Academic Integrity: Students at the University of Washington (UW) are expected to maintain the highest standards of academic conduct, professional honesty, and personal integrity.

The UW School of Public Health (SPH) is committed to upholding standards of academic integrity consistent with the academic and professional communities of which it is a part. Plagiarism, cheating, and other misconduct are serious violations of the University of Washington [Student Conduct Code](#) (WAC 478-120). We expect you to know and follow the university's policies on cheating and plagiarism, and the [SPH Academic Integrity Policy](#). Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the University of Washington [Community Standards and Student Conduct](#) website.

Here are links for the text that is highlighted above in boldface:

UW Student Conduct Code (WAC 478-120)

<http://www.washington.edu/cssc/student-conduct-overview/student-code-of-conduct/>

SPH Academic Integrity Policy

<http://sph.washington.edu/students/academicintegrity/>

Community Standards and Student Conduct

<http://www.washington.edu/cssc/>

Teaching Assistant (TA): If you have any concerns about the class or your TA, please see the TA about these concerns as soon as possible. If you are not comfortable talking with the TA or not satisfied with the response that you receive, you may contact the Department of Biostatistics Associate Director of Academic Affairs (biostgp@uw.edu). If you are still not satisfied with the response that you receive, you may contact the Department of Biostatistics Chair (bchair@uw.edu). You may also contact the Graduate School at G-1 Communications Building, by phone at 206-543-5139 or by email at raan@uw.edu.