M88-525

Introduction to Biostatistics

Fall 2015

Syllabus

Instructor

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Office Hours
by appointment

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none

Course Overview

Introduction: This course introduces the basic principles and methods of biostatistics, providing students a sound methodological foundation for public health practice.

Purpose: The purpose of the course is to teach fundamental concepts and techniques of descriptive and inferential statistics with applications in health care, medicine, public health, and epidemiology. Basic statistics, including probability, descriptive statistics, inference for means and proportions, and regression methods are presented. The analytic methods and applications will be linked to topics including health promotion, epidemiology, and program evaluation.

Competencies to Assessments:

Competencies	Associated learning objective	Assessment of Learning Objectives
Describe the approaches to disease prevention and control using tools from the five core areas of public health: behavioral science, biostatistics, environmental health, epidemiology, and health management and policy	a. Distinguish between numerical and categorical data, including which methods to use for each b. Know the appropriate application and limitations of hypothesis tests and regression methods	• Quizzes • Weekly assignments • In-class presentation of public health research • Midterm and final exams
Appropriately utilize qualitative and quantitative data in order to effectively address public health problems	a. Choose an appropriate graphical or tabular display for a given data set and question b. Determine which basic statistical method(s) is/are most appropriate to analyze the data at hand c. Analyze data using fundamental statistical methods	• Quizzes • Weekly assignments • In-class presentation of public health research • Midterm and final exams
MPH 6: Use an evidence-based approach for the development of public health programs and policies	a. Draw conclusions from statistical analyses and place them into the appropriate public health context	• Weekly assignments • In-class presentation of public health research • Midterm and final exams

Course Description

Course Format: The class format includes lectures, computer exercises, practical problems, and teamwork. The various formats of the quizzes and assignments are chosen to:

1. Provide regular feedback
2. Require repetition of core techniques necessary for mastery of statistical thinking and analysis
3. Challenge students to tackle both straightforward and difficult applications of descriptive and analytic statistics to practical public health problems
4. Incorporate statistical tools and results into oral and written presentation, emphasizing proper use of language and effective communication.

Course Elements and Requirements:
Texts: There is 1 text required for this class:
Author(s): TRIOLA & TRIOLA
Title: BIOSTATISTICS FOR THE BIOLOGICAL AND HEALTH SCIENCES.
ISBN: 9780321194367

Software: SPSS 23.0 is available on student computers in the College for Public Health and Social Justice as well as in student computing labs on campus. You may rent it from e-Academy via the e-store at OnTheHub. (http://www.onthehub.com/). Make sure to get the Standard version, not the Base. You may rent either a 6 month or 12 month version. Older versions of SPSS will also work for this class.

- https://estore.onthehub.com/WebStore/OfferingsOfMajorVersionList.aspx?pmv=89cf975c-47c3-e411-940a-b8ca3a5db7a1&cmi_mnuMain=ed6ad73c-7bc7-e011-ae14-f04da23e67f6

In addition to the text and access to SPSS a basic calculator will be useful for some classes. The calculator function on a cell phone will suffice.

Grading Determination and Policy:
The final grades are: A ($\geq$92 to 100 points), A- ($\geq$90 to 91) B+ ($\geq$87 to 89 points), B ($\geq$82 to 86 points), B- ($\geq$80 to 81 points), C+ ($\geq$77 to 79 points), C ($\geq$72 to 76) C- ($\geq$70 to 71) and F (<70 points). Final grades will not be rounded.

For this class the final grade will be computed using the following scale:
Assignments – 20%

- Due by 4:30 p.m. day of next class period. Assignments are graded 0-non-turned in, 1-incomplete, 2-complete.

Quizzes – 20%

- Quiz most every day of lecture covering the previous lecture

Labs 1-3 – 30% (10% each)

- Refer to handout on labs for instructions on formatting. Points will be deducted for late labs and labs that are not properly formatted.
- Labs must be done with a partner.

- Grade will be reduced by 20 points for every 24 hours past due

Final – 20%

- Comprised of SPSS portion and written portion
- Entire final must be **done individually**
- Grade will be reduced by 20 points for every 24 hours past due

Presentation – 5%

- Done with partners
- Details TBA

Participation & Teamwork – 5%

All assignments and labs are to be completed on time unless other arrangements have been made with the instructor at least one week in advance of due date, **no late assignments** will be accepted. Students will be allowed to "retake" missed items on quizzes and receive half of the missed points added to their grade for the quiz.

Feedback on Assignments: Timely feedback on assignments is needed in order to assure that students are aware of their progress. For routine assignments, quizzes, presentations, and exams feedback will be provided within two weeks after the due date. For longer assignments such as labs, feedback will be provided within three weeks after the due date of the assignment. In the rare event that these deadlines cannot be met, students should be informed of the delay and the extra time needed in providing feedback.

Course Calendar

Date	Topic	Learning Objective	Read	Assignments due
Part I: Descriptive Statistics				
Week 1	Looking at your data • Types of Data • Tables & Graphs • Central tendency & dispersion	3a, 5b, 5c, 6a	Triola • Ch 1.1-1.2 • Ch 2	In class competency quiz
Week 2	Lab 1	3a, 5a, 6a	SPSS videos posted on Blackboard	Quiz 1 HW 1
Week 3	Probability • Bayes Theorem • Sensitivity & Specificity • Odds Ratio & Relative Risk	5b, 5c	Handout: • Cartoon Guide Triola • Ch 3	Lab 1
Week 4	Distributions • Binomial distribution • Poisson distribution • Normal distribution • Central Limit Theorem • Standard scores/z-scores	5b, 5c	Triola • Ch 4.1-4.4 • Ch 5.1 – 5.6	Quiz 2 HW 2
Part II: Inferential Statistics				
Week 5	Statistical inference: • Samples and populations • Power • Confidence intervals • p-values • Type I & II error	3b, 5a, 5b, 5c, 6a	Triola • Ch 6.2 • Ch 7.1-7.2	Quiz 3 HW 3

Date	Topic	Learning Objective	Read	Assignments due
Week 6	One and two groups (continuous outcomes): • One-sample population mean • Paired sample t-test • Independent samples t-test	3b, 5a, 5b, 5c, 6a	Triola • Ch 6.3-6.4 • Ch. 7.3-7.5 • Ch 8.1-8.4	Quiz 4 HW 4
Week 7	Lab 2	3b, 5a, 5b, 5c, 6a	SPSS videos posted on Blackboard	Quiz 5 HW 5
Week 8	Comparing more than two groups (continuous outcomes): • One-way ANOVA • Two-way ANOVA	3b, 5a, 5b, 5c, 6a	Triola • Ch 11	Lab 2
Week 9	Comparing two groups (categorical outcomes): • Chi-square test • McNemar's test • Odds ratio • Relative risk	3b, 5a, 5b, 5c, 6a	Triola • Ch 10	Quiz 6 HW 6
Week 10	• Correlation • Linear Regression	3b, 5a, 5b, 5c, 6a	Triola • Ch 9	Quiz 7 HW 7
Week 11	Multiple predictor variables • Multiple regression • Logistic regression	3b, 5a, 5b, 5c, 6a		Quiz 8 HW 8
Week 12	Lab 3	3b, 5a, 5b, 5c, 6a	Field - Recommended • Ch 11 • Ch 18 • Ch 7	Quiz 9 HW 9

Date	Topic	Learning Objective	Read	Assignments due
Week 13	Non-parametric Tests • Sign test • Wilcoxon test • Kruskal-Wallis test • Rank correlation	3b, 5a, 5b, 5c, 6a	Triola • Ch 12	Lab 3
Week 14	• Presentations • Wrap-up and Review • Take home SPSS section of Final handed out	3b, 5a, 5b, 5c, 6a		
Week 15	Final • In class section • In class competency quiz			Take home SPSS section of final due 4:30 pm.

Labs - handout

All Labs must be conducted and formatted in the manner stated within this handout in order to receive full credit.

Analysis for labs (except for the final lab) may be done with a partner. This allows you to practice discussing statistical concepts with others. If you decide to work with a partner, please email me your names. Then I can set your team up in Blackboard. One lab write up is due for the pair. Each partner will receive the same grade on the lab.

All labs are required to include **annotated** SPSS syntax attached to the end of the write-up. We will cover what annotated syntax is during the first lab.

The write up must be typed, single space in 12 point font with 1 inch margins. Answers must be numbered and written in **complete sentences.** Pages must be numbered with your last names at the top of each page.

Whether implicitly stated or not, all statistical tests must include your null hypothesis, alternative hypothesis, results, and conclusions. In your results please give the test statistic, critical value, and exact p-values calculated. Example: A statistical difference in BMI between drug groups was found ($F = 4.25$, $p = 0.016$).

DO NOT include SPSS output directly. Rather create your own tables with the necessary results. Your table must meet the definition of a "good" table as described on day 1. This means title at the top and minimizing lines within the table. Figures may be copied and pasted directly from SPSS. Please bear in mind that they will be printed in black and white for grading. They must also include an appropriate title.