

SYLLABUS
Online EPID CPH576a: Biostatistics in Public Health
Spring 2015

Instructor:

Paul Hsu, Ph.D.

Office: Drachman A232; Phone: 626-5054; Email: pchhsu@email.arizona.edu

Introduction:

This online course introduces biostatistical methods and applications. We will cover [descriptive statistics](#), [probability theory](#), and a wide variety of [inferential statistical techniques](#) that can be used to make practical conclusions about empirical data. We will use a two-fold approach to mastery of this material. On the one hand, we will look in some detail at how statistical procedures are employed, and you will conduct a number of basic procedures by hand in order to fully understand the logic of statistics. In order to complete this goal successfully, a prerequisite of at least one year of college mathematics is required. (Note that I will not check on this prerequisite formally, but you would be well advised to check with me if you have doubts about how well your background prepares you for this course). Additionally, you will learn how to use a computer package, Stata, in order to quickly perform statistical analyses in more complex situations. This combined approach will enable you to be an educated consumer and producer of statistical knowledge in the real world.

Course Objectives:

1. Determine the proper method to be used in analyzing data sets (e.g., parametric or non-parametric method? independent or paired samples?).
2. Apply your statistical knowledge to designing research studies. This includes computing the sample sizes necessary to show statistical significance and selecting the proper study design.
3. Better understand medical and scientific journal articles which frequently rely heavily on statistical procedures.
4. Perform basic statistical analysis using a computer statistical software package (Stata).
5. Be able to interpret computer outputs for the more commonly used statistical tests.

Biostatistics Competencies:

1. Ability to identify appropriate statistical tools to address specific scientific questions
2. Ability to select appropriate research designs to meet the needs of various studies, and be able to explain the limitations of implemented designs
3. Ability to skillfully engage in statistical collaboration with mentors, colleagues, and clients
4. Demonstrate excellent presentation skills and the ability to explain statistical concepts and findings to a general scientific audience
5. Demonstrate skills in data management to handle a variety of practical problems in data format and structure
6. Demonstrate advanced working skills in application of computer systems and appropriate statistical software
7. Demonstrate advanced competencies in areas of professional expertise and scholarship enabling them to advance to further postgraduate study in biostatistics
8. Demonstrate understanding of methods of data analysis and data monitoring

Textbook:

We will be using the 7th edition of Fundamentals of Biostatistics, by Rosner, published by Cengage Learning. It is available in the Medical School Bookstore and can be also purchased

online, too. eBook and eChapters (cheaper compared to buying the whole book) are also available. This text comes with a companion website (http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20bl&product_isbn_issn=9780538733496). The data sets, including the data description, used in the book and homework can be downloaded from the companion website. You may also want to download the Stata Survival Guide, which can be found on the website of this course.

Exams and assignments:

There is also homework due often. You need to upload your homework to the [dropbox](#) on the course D2L site before it is due. For each homework, the answer key will become available for you after the due day, so that you know if you are getting the right answer or not. If you don't have the right answer, you know to keep working until you figure it out. This list has been compiled recently, and although it has been checked once, it is possible that it contains the occasional error. If you are in disagreement with the answer key, but keep getting the same 'wrong' answer, there is a slight possibility that the key contains an error. Check with me or the TA for confirmation if uncertain. **DO NOT** put off homework until the last minute! Doing the homework as soon as possible after the relevant material has been covered in lecture will make the task easier for you, and will maximally reinforce the material in your mind. **The best way to excel on the exams is to master the homework.** Given the explicit scheduling of homework due dates and the logistical difficulty involved in large numbers of detailed answers, late homework assignments will not be accepted. Homework must be uploaded to the dropbox on the due date. Faxed and mailed submissions will not be accepted unless prior arrangements have been made (eg, due to travel to conferences, etc.). Note that most chapters have two homework assignments, one by typing in order to submit the homework electronically and one using Stata. Bearing in mind this definition of homework assignment, the [lowest four homework assignments](#) will be dropped. It is wise to save these drops for illness or emergencies. Please be neat and orderly in your homework assignments. Homework by typing and homework in Stata need to be submitted as separate files. Bold, highlight, or otherwise emphasize those that are obtained as computer output. Obviously, since you will have answers to most of the questions, the grading will focus on how you arrived at the answers. Therefore, for homework that is not legible and well organized, only partial credit will be awarded. On both homework assignments and exams, partial credit is doled out generously; my goal is to see that you are thinking statistically. Therefore, on exams and homework always show your work (again, be as neat and clear as possible). Exams and homework contribute to your final grade as follows:

Homework **15%**

Quizzes **10%** (if you take **ALL** quizzes by **May 7th**!)

Three Exams **70%** (**20%** 1st midterm, **20%** 2nd midterms; **30%** final)

Essay **5%**

Note: Throughout the semester there will be several opportunities for you to earn bonus points.

Grading:

Final grades are based on the following point system:

A: $\geq 90\%$

B: $\geq 80\%$ and $<90\%$

C: $\geq 70\%$ and $<80\%$

D: $\geq 60\%$ and $<70\%$

E: $< 60\%$

Note: I will not round up the final grade.

Announcements:

A D2L course site will be created for this course. All course announcements will be posted on the site. So check out the course site constantly! In addition, a list of students taking this course can be found on the course site. Students can use the list to find their study partners and exchange experience.

Course Format:

The lectures will be delivered through video streaming, including some related YouTube clips. Students are required to have RealPlayer to watch the videos.

Lectures, Discussions and Quizzes:

All of the lectures can be found under content on the D2L site. All of discussions, including homework discussions, can be found under discussions on the D2L site. All of quizzes, including exams, can be found under quizzes on the D2L site.

Webinars:

Throughout the semester there will be several optional webinars. For example, there will be a webinar [every Monday at 4:30pm in which I will go over homework problems and before each exam](#) in which I will review the exam material. You need to have internet access to join the webinar and can participate in discussion using either texting or microphone/speaker. The webinar URL will be posted on the course D2L site and emailed to you, as well.

Academic Integrity:

Students are expected to abide by the University of Arizona Code of Academic Integrity found at <http://deanofstudents.arizona.edu/codeofacademicintegrity>.

Classroom Behavior:

Students are expected to be familiar with the UA Policy on Disruptive Behavior in an Instructional Setting found at <http://web.arizona.edu/~policy/disruptive.pdf> and Policy on Threatening Behavior by Students found at <http://web.arizona.edu/~policy/threatening.pdf>.

COPH Grievance Policy: College of Public Health students who believe they have been subjected to unfair treatment in the administration of academic policies may seek resolution of their complaints through the Graduate College found at <http://grad.arizona.edu/academics/policies/academic-policies/grievance-policy>.

SCHEDULE:

Week	Topic	Reading
Week 0	Introduction	Ch. 1
Week 1	Descriptive Statistics	Ch. 2 (skip 2.7)
Week 2	Probability	Ch. 3 (skip 3.8~3.10)
Week 3	Distributions	Ch. 4 and 5 (skip 4.1~4.7; 4.13; 5.6~5.8)
Week 4	Estimation	Ch. 6 (skip 6.3~6.4; 6.9)
Week 5	Exam 1	Ch. 1~6
Week 6	Hypothesis Testing: One-Sample Inference	Ch. 7: 7.1~7.4; 7.7; 7.12~7.13
Week 7	Hypothesis Testing: Two-Sample Inference	Ch. 8 (skip 8.9~8.11)
Week 8	Nonparametric Methods	Ch. 9
Week 9	Hypothesis Testing: Categorical Data	Ch. 10 (skip 10.5~10.8)
Week 10	Spring Break	
Week 11	Power and Sample Size	7.5, 7.6; 8.10; 10.5
Week 12	Exam 2	Ch. 7~10
Week 13	Simple Linear Regression	Ch. 11: 11.1~11.6
Week 14	Multiple Linear Regression	Ch. 11: 11.7~11.10
Week 15	Multisample Inference (ANOVA)	Ch. 12 (skip 12.10)
Week 16	Review Final Exam	
Week 17	Final Exam	