Mel and Enid Zuckerman College of Public Health
University of Arizona

SYLLABUS
Biostatistics 576A Biostatistics in Public Health
FALL 2017

Time:	Tuesday and Thursday 4:00 pm – 5:15 pm
Location:	Drachman Hall A114
Instructor:	Denise J. Roe, Dr.P.H. Professor, Epidemiology & Biostatistics 1933 University of Arizona Cancer Center Telephone: 626-2281 droe@email.arizona.edu
Office Hours:	Tuesdays and Thursdays 2 pm – 3 pm Tuesdays: Drachman Hall A122 Thursdays: Drachman Hall A319 By appointment (email to schedule an appointment): Directions to 1933 University of Arizona Cancer Center: Enter the Cancer Center using the doors by Kiewit Auditorium (south-east corner of the building) Take the stairwell down to the first floor Enter the door to the left at the bottom of the stairwell Take the first left towards the Business Office Follow the signs to the Biometry Shared Service My office is the next to last door on the right
Teaching Assistant:	Amber Koslucher akoslucher@email.arizona.edu
TA Office Hours:	Tuesday 3 pm – 4 pm (Drachman Hall A319) Wednesday 7 pm – 9 pm (Online)

Catalog Description: This course introduces biostatistical methods and applications, and 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. Students will also be learning to use a statistical software package (STATA or SAS).

Course Prerequisites: One year of college-level mathematics

Course Learning Objectives: At the end of the course, you should be able to:
- Identify the properties of given data sets, including the level of measurement for each variable
- Apply appropriate descriptive statistics to the data according to its measurement type
- Apply appropriate inferential statistics to the data according to its measurement type
- Formulate and test hypotheses
- Use a computer statistical software package (Stata or SAS) to accomplish these objectives
- Apply your statistical knowledge to the design of research studies, including selection of proper research design and determination of sample sizes necessary to show statistical significance
- Interpret and critique medical and scientific journal articles which frequently rely heavily on statistical procedures

MPH Competencies Covered: At the end of the course, you should be able to:

Analytical Skills:
- Define a problem
- Determine appropriate uses and limitations of data
- Select and define variables relevant to defined public health problems
- Evaluate the integrity and comparability of data and identify gaps in data sources
- Understand how the data illuminate ethical, political, scientific, economic, and overall public health issues
- Understand basic research designs used in public health
- Make relevant inferences from data

Communication Skills:
- Communicate effectively both in writing and orally (unless a handicap precludes one of those forms of communication)
- Interpret and present accurately and effectively demographic, statistical, and scientific information for professional and lay audiences adapting and translating public health concepts to individuals and communities

Basic Public Health Science Skills:
- Define, assess, and understand the health status of population, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services
- Understand research methods in all basic public health sciences
- Apply the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries

Biostatistics MPH and MS Competencies Covered: At the end of the course, you should be able to:
- Identify appropriate statistical tools to address specific scientific questions
- Demonstrate excellent presentation skills and the ability to explain statistical concepts and findings to a general scientific audience
- Demonstrate understanding of methods of data analysis and data monitoring
- Describe the roles Biostatistics serves in the discipline of public health

- Suggest preferred methodological alternatives to commonly used statistical methods when assumptions are not met
- Recognize strengths and weaknesses of proposed approaches, including alternative designs, data sources, and analytical methods

Course Notes: A webpage has been created for this class using the Desire 2 Learn (D2L) interface. The course website contains the syllabus, lecture recordings, class notes, homework assignments and exams. Class announcements also will be posted on this site, so it is a good idea to check the site before each class to stay current.

To access the 576A website, login at: http://d2l.arizona.edu
- Click the 'UA NetID' Login.
- Enter your NetID and password, as you would to access your UA email account.

  Under 'My Courses', click on: 'BIOS 576A FA17 002'
     o Announcements: This section contains any class announcements
     o Content: Access the syllabus, class notes, homework assignments and exams.
     o Lecture Recordings: All lectures will be recorded using the Panopto system. They are available shortly after the lecture is over. The recordings remain available throughout the course.

To access the recorded lectures you must use Firefox or Chrome or Safari as the browser when you log into D2L. Internet Explorer will not work.

Recommended Text: *Fundamentals of Biostatistics 8th Edition*, Bernard Rosner, Brooks/Cole, Cengage Learning, Boston, MA, 2016

The 8th Edition is available for purchase in the AHSC bookstore or from the publisher or other online sites. Alternatively you may rent a hard copy or purchase electronic access from the publisher. The link is:

https://www.cengagebrain.com/shop/ProductDisplay?langId=-1&storeId=10151&catalogId=10057&productId=713918

The link for the book companion site is:

http://www.cengage.com/cgi-wadsworth/course_products_wp.pl?fid=M20b&product_isbn_issn=9781305268920&token=9AE29419C1268A54CA68E32085062519410D57EECD1582449D0D980B44D9EDFCAB5D7594F170D4043A192E004D101E5706E711DD63BDA74735DF87FD02D55051CA62B438359CBF68

The book companion site includes:
- Data Set Descriptions (.doc)
- Data Sets (required for homework)
- Study Guide (includes a summary of each chapter with additional problems and solutions)

A copy of the 7th Edition can be checked out from Laura Shriver (206 FF).

Course Requirements:

1. Review the notes before class and bring questions with you to the lecture

2. Homework
- The homework assignment for each chapter is included in the notes with the due date.
- Questions about the homework will be discussed the class before the homework is due. This is an opportunity to check that you have the correct answers if you work through the homework before class.
- **Late homework assignments will not be accepted.** Homework must be turned in during class on the due date or via the appropriate assignment folder by **midnight**. Please make sure that you submit the homework to the correct assignment folder.
- Scoring: Each question is worth two points. Partial credit (one point) will be given if an honest attempt at the problem was made even without the correct answer. No credit (zero points) is given if the problem was not attempted.
- Format: The homework can be typed or handwritten. Circle or highlight numeric answers that you calculate by hand. Remember to show your work so that the TA can give partial credit for a wrong answer. Bold, highlight, or otherwise **emphasize** those results that are obtained as computer output. Only include the correct computer output.
- **Staple** your homework answers. Remember to put your **name** on the front page at least.
- Answers are posted on the D2L website by noon the day after the assignment is due. Please check the D2L site when your homework is returned to make sure that you understand the answers if you did not receive full credit.
- Keep copies of all of your homework so that you can study for the exams while your submitted work is being graded by the TA.
- You can drop your **lowest two** homework scores. It is best to reserve these for times that you are unexpectedly out of town, cannot turn in the homework due to illness, or your computer crashes with your homework on it.
- Please do **not** ask if you can turn in your homework late. The policy of dropping your **lowest two** scores was designed to protect you if the submission of your homework is delayed.

3. Take-Home Examinations

Exam	Date Distributed	Date Due	Lectures and homework
Exam 1	Thursday, September 28	Tuesday, October 3	Chapter 1 - 6
Exam 2	Thursday, November 2	Tuesday, November 7	Cumulative with emphasis on Chapters 7 – 10
Final	Tuesday, December 5	Tuesday, December 12	Cumulative with emphasis on Chapters 11 – 12

- Exams will include problems similar to the homework, interpretation of results from published papers, and selection of the most appropriate statistical analysis approach.
- You will need to use STATA or another statistical analysis program to complete the exams.
- All exams must be turned in no later than midnight on the date due to the D2L assignments folder.

- For each exam, all students must sign the following statement (first page of the exam):

I have not discussed any aspects of this exam with other class members, former class members, other students, or faculty. I understand that if there is evidence that I have violated these restrictions, my grade on the exam will be reduced by 50%.

Signature	Printed Name	Date

4. Extra Credit
- **No** extra credit is available for the course

Grading/Student Evaluation: Homework, exams 1 and 2 and the final contribute to your final grade as follows:

Homework	10% (each chapter weighted the same, even if length differs)
Exam 1	30%
Exam 2	30%
Final	30%

Final grades are based on the following point system:
$$A = 90\text{-}100\%$$
$$B = 80\text{-}89\%$$
$$C = 70\text{-}79\%$$
$$D = 60\text{-}69\%$$
$$E = 59\% \text{ or less}$$

Grades will not be curved. The instructor reserves the right to revise this scale, if necessary.

Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies University policy regarding grades and grading systems is available at:
http://catalog.arizona.edu/policy-type/grade-policies

Course Schedule: Any changes to the following schedule will be announced in lecture or the D2L site. You are responsible for obtaining information on any changes, even if you miss class.

Date	Topic	Rosner	Due Date
8/22	General Overview and Introduction to STATA	Ch. 1	
8/24, 8/29	Descriptive Statistics	Ch. 2	8/31
8/31, 9/5	Probability	Ch. 3	9/7
9/7, 9/12	Discrete Probability Distributions	Ch. 4	9/14
9/14, 9/19	Continuous Probability Distributions	Ch. 5	9/21
9/21, 9/26	Estimation	Ch. 6	9/28
9/28	Exam 1 Review	Ch. 1 – 6	
9/28 **10/3**	**Exam 1 Available** **Exam 1 Due** (no class)		
10/5, 10/10	Hypothesis Testing: One-Sample Inference	Ch. 7	10/12
10/12, 10/17	Hypothesis Testing: Two-Sample Inference	Ch. 8	10/19
10/19	Nonparametric Methods	Ch. 9	10/26
10/24, 10/26	Hypothesis Testing: Categorical Data	Ch. 10	11/2
10/31	Literature Examples of Hypothesis Testing		
11/2	Exam 2 Review	Ch. 7 – 10	
11/2 **11/7**	**Exam 2 Available** **Exam 2 Due** (no class)	Ch. 7 – 10	
11/9, 11/14, 11/16	Regression and Correlation Methods	Ch. 11	11/21
11/21, 11/23	**No Class – Happy Thanksgiving**		
11/28	Multisample Inference	Ch. 12	11/30
11/30	Literature Examples of Regression and Multisample Inference		
12/4 **12/4**	Review **Final Available**	Ch. 11 – 12	
12/12	**Final Due**		

Statistical Software: You will need to use STATA or SAS or SPSS or R to be able to complete the analyses required for the course. STATA will be emphasized during the lectures.

A set of modules for learning STATA and SAS are on the D2L site. All students enrolled in the course have access to these modules. Instructions to open the modules are on the D2L site.

A one-unit course "Introduction to Statistical Analysis using STATA" (EPID/CPH 503) is available to those students who view all of the tutorials and complete an on-line exam for each module. You will need to register for the course to have access to the on-line exams and to receive credit for the course.

A one-unit course "Introduction to Statistical Analysis using SAS" (EPID/CPH 504) is available to those students who view all of the tutorials and complete an on-line exam for each module. You will need to register for the course to have access to the on-line exams and to receive credit for the course.

Computer Labs: Stata and SAS are available for public use at two locations:

Drachman Hall Computing Lab: Drachman A319, open weekdays, from 8-5. Note that it is not available Tuesdays and Thursdays from 11 am – 12:30 pm due to a scheduled class.

Arizona Health Sciences Library Computer Lab: AHSC 2150, open every day 6am-midnight. These computers are behind the information/reference desk on the main floor. The first couple of banks of machines is not part of the lab, but is rather used for lit searching, etc. The lab is the 'walled off' section of computers behind the first couple of banks. You may print output here for a fee. Note that these are public facilities, and may or may not be crowded on a given day.

Students must register to use the AHSC Library Computer Lab at the Library Information Desk. A University of Arizona Catcard is required.

Purchasing STATA or SAS:

STATA: You can order online at the following link:

http://stata.com/order/new/edu/gradplans/student-pricing

STATA/IC 15 is available in the classroom and labs. It is appropriate for virtually all analyses except for very large datasets with an extremely large number of variables. STATA/IC 15 can be purchased at an academic rate of $89 for a one-year license and $198 for a perpetual license. After you purchase STATA you will be given directions on downloading and installing the package, with the necessary activation key.

PDF versions of the manuals can be accessed from the Help Tab within STATA. There is no reason for you to purchase the manuals. If you want to borrow a manual from the Epidemiology /Biostatistics library, check it out with Laura Shriver.

SAS: SAS 9.4 can be ordered from the U of A BookStore. The cost is $99 per year. The link with the necessary information is: http://uabookstore.arizona.edu/technology/stulicense.asp

SAS also has a free "University Edition" of the SAS package. The link with the necessary information is: http://www.sas.com/en_us/software/university-edition.html

Students who plan to use SAS in the workplace should learn SAS 9.4 as the "University Edition" is not available outside the University.

Tips for Succeeding in the Course:

1. Attend class or view the Panopto lecture
2. Read the lecture notes before coming to class
3. Ask questions about the notes and textbook in class
4. Do your homework and exams early
5. Check your homework answers against the answer key
6. Turn your homework, Exam 1 and Exam 2 in on time
7. Ask questions until you understand the material

<ins>Required Statements:</ins>

Class Attendance/Participation: Class attendance and/or reviewing the Panopto recorded lectures is **strongly encouraged**, but not required. If a student misses class, they are responsible for meeting all course deadlines, and for working with other students, the TA and the instructor (during office hours) to catch up.

The UA's policy concerning class attendance, participation, and administrative drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored, http://deanofstudents.arizona.edu/

Communications: You are responsible for reading emails sent to your UA account from your professor and the announcements that are placed on the course web site. Information about readings, news, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: https://www.registrar.arizona.edu/personal-information/official-student-email-policy-use-email-official-correspondence-students

Disability Accommodation: It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately, so that we can discuss options. You are also welcome to contact the Disability Resources (520-621-3268) to establish reasonable accommodations (as it is very important that you be registered with the DRC).   For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/students

Academic Integrity: All students are expected to do their own work. For homework, feel free to ask each other questions about concepts and procedures. However, when it comes time to complete the homework to turn in, do that on your own. Duplicate homework will be considered a breach of academic integrity. No communication between students of any sort is allowed during exams or the final.

All UA students are responsible for upholding the University of Arizona Code of Academic Integrity, available through the office of the Dean of Students and online: The official policy is found at: http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity

Classroom Behavior: Students are expected to be respectful of the instructor and other students at all times (including limited talking, no reading newspapers, etc.). Cell phones should be in the mute or vibrate position. If you must take an emergency call during class please leave class quietly to speak with the caller (do not leave and return more than once as this disrupts the rest of the class). Please do not text during class. Students may use their laptops during class only for course related material.

The Dean of Students has set up expected standards for student behaviors and has defined and identified what is disruptive and threatening behavior. This information is available at: http://policy.arizona.edu/education-and-student-affairs/disruptive-behavior-instructional-setting

Threatening Behavior Policy: The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self, http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Nondiscrimination and Anti-harassment Policy:
The University of Arizona is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Grievance Policy: Should a student feel he or she has been treated unfairly, there are a number of resources available. With few exceptions, students should first attempt to resolve difficulties informally by bringing those concerns directly to the person responsible for the action, or with the student's graduate advisor, Assistant Dean for Student and Alumni Affairs, department head, or the immediate supervisor of the person responsible for the action. If the problem cannot be resolved informally, the student may file a formal grievance using the Graduate College Grievance Policy found at:
http://grad.arizona.edu/academics/policies/academic-policies/grievance-policy

Grade Appeal Policy: http://catalog.arizona.edu/2015-16/policies/gradappeal.htm

UA Smoking and Tobacco Policy: The purpose of this Policy is to establish the University of Arizona's (University) commitment to protect the health of University faculty, staff, students, and visitors on its campuses and in its vehicle. The latest version of the policy is available at: http://policy.arizona.edu/ethics-and-conduct/smoking-and-tobacco-policy

Syllabus Changes: Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Plagiarism: What counts as plagiarism?
- Copying and pasting information from a web site or another source, and then revising it so that it sounds like your original idea (beware of Wikipedia).
- Doing a homework assignment with a friend and then handing in separate assignments that contain the same ideas, language, phrases, etc.
- Paraphrasing a passage without citing it, so that it looks like your own.
- Hiring another person to do your work for you, or purchasing a paper through any of the on- or off-line sources.