

**STUDENT WARNING:** This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

## American Public University System

*The Ultimate Advantage is an Educated Mind*

**School of Health Sciences**  
**COURSE PBHE520**  
**Biostatistics with Lab**  
**Credit Hours: 4**  
**Length of Course: 8 weeks**  
**Prerequisite: None**

### Instructor Information

*Please refer to the Syllabus tab for your instructor's contact information and biography.*

### Course Description (Catalog)

This course is an introduction to basic concepts, principles, and techniques/methods of statistics as applied to public health. Major topics to be covered include statistical models, distributions, probability, measures of central tendency, measures of variability, percentiles, sampling, correlation, standard scores, and tests of significance.

### Course Scope

The PBHE520 Biostatistics with Lab is a distance learning course designed to help students achieve a greater understanding of the statistical processes used in decision analysis and research in the Public Health arena. The course covers a variety of statistical concepts, principles, and techniques/methods relevant to the decision-making and research associated with the administration of Public Health processes. The course is designed to assist students to understand how statistical concepts are practiced and incorporated into diverse areas of Public Health.

*(Note to students: The course materials, assignments, learning outcomes, and expectations in this upper level undergraduate course assume that the student has completed all lower level general education and career planning course work necessary to develop research, writing, and critical thinking skills. Students who have not fulfilled all general education requirements through courses or awarded transfer credit should strongly consider completing these requirements prior to registering for this course).*

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## Course Learning Objectives

After successfully completing this course, students will be able to

- Describe the role biostatistics serves in the discipline of public health.
- Describe basic concepts of probability, random variation, central tendencies, and other commonly used statistical distributions.
- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used on these distinctions.
- Apply common statistical methods for inference.
- Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question.
- Determine the appropriate use and limitations of quantitative data for health problem identification and resolution.
- Interpret results of statistical analyses found in public health studies.
- Apply evidence-based principles and scientific knowledge base to critical evaluation and decision making in public health.
- Describe how public health information infrastructure is used to collect, process, maintain, and disseminate data.
- Develop a presentation based on statistical analysis for both public health professionals and educated lay audiences.

## Course Delivery Method

This course delivered via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. Online assignments are due weekly as noted on the course outline and can include Forum questions and written assignments. Assigned faculty will support the students throughout this eight-week course.

## Course Materials

### Required Course Textbook:

1. Gertsman, B. B. (2014). *Basic Biostatistics: Statistics for Public Health Practice*. Sudbury, MA: Jones and Bartlett Publishing. ISBN: 9781284036015
2. American Psychological Association Publication Manual, 6<sup>th</sup> Edition.

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3. Other material can be found in the Lesson area of the course.

### **Academic Writing Requirements:**

The School of Health Sciences requires use of APA format and style and all students are encouraged to have a current copy of the *APA Publication Manual*. All written assignments are to be submitted in APA format style unless otherwise noted in the assignment directions.

### **Web Sites**

In addition to the required course texts, the following public domain web sites are useful. Please abide by the university's academic honesty policy when using Internet sources as well. Note web site addresses are subject to change.

- None

## **Evaluation Procedures**

### **Forum**

Please join the forums each week. Replies must be posted in the week due and replies after the end of the each week will not be graded. The Forums are for student interaction and input should be submitted before the week ends in order to fully participate in the discussions. Students should demonstrate their own knowledge in the forums and avoid copying and pasting from websites.

#### **Guidelines:**

- Post the initial response to each forum by 11:55pm, ET, Wednesday.
- Initial responses should be no less than 450-500 words.
- Initial responses are to be original in content and demonstrate a thorough analysis of the topic.
- Reply to at least 2 of your classmates in each forum by 11:55pm, ET, Sunday.
- Replies to classmates should be no less than 200 words.
- Responses to classmates are significant to advance the forum.
- All forums can be accessed in the Forums section of the course.

Students will be responsible for providing a peer response posting for at least two (2) of their peers' postings, unless there are less than 3 students in the course, where only one (1) peer posting will be required. Your peer postings should challenge or expound upon at least one of the points made by your peer, and "I agree" does not constitute as an adequate response. As graduate students, you will be expected to provide comprehensive, relevant and well supported points in your assignments.

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We all bring something unique to the classroom, from our understanding, our experiences, and our value systems. We honor and respect each person's diverse beliefs to help us see beyond the classroom to be the most effective individuals we can be. Therefore, we should all be respectful of others while expressing our viewpoints and opinions. Proper netiquette behavior is expected. Any inflammatory, demining or disrespectful language in a posting will be immediately removed from the discussion space.

### **Assignments:**

Each week, you will be assigned a topic covered in the weekly readings to demonstrate your understanding of the material by writing a short paper. This assignment should be at least 1-1/2 pages long or at least 450 words. You will need to cite within the text and have a reference section in APA format (6th edition) as well as adhere to standard writing for graduate level.

- Step 1: You will define the concept from your textbook and/or various sources first. You are demonstrating that you understood the concept that you have chosen. You are going to define this in 2-3 sentences by using your textbook and/or other sources.
- Step 2: You are going to pick an article that utilized the concept that you have chosen. You want to take a look at the following sites to select your article:
  - Journal of Public Health: <http://jpubhealth.oxfordjournals.org/>
  - European Journal of Public Health: <http://eurpub.oxfordjournals.org/>
  - American Journal of Epidemiology: <http://aje.oxfordjournals.org/>
  - The Journal of Infectious Diseases: <http://jid.oxfordjournals.org/>
  - Clinical Infectious Diseases: <http://cid.oxfordjournals.org/>
  - Health Promotion International: <http://heapro.oxfordjournals.org/>
  - or Go to the APUS library for other journals.
- Step 3: Thoroughly READ the article and TAKE notes.
- Step 4: Complete the writing of your summary with a review of this article. In your assessment of this article, you MUST provide how the researchers used the statistical concept in their research by doing the following: 1) Explain the sample (i.e., population used), 2) Summarize the statistical analysis and what software or analysis package was used and 3) Evaluate and describe the results and conclusions in your own words. It is very important that you are able to paraphrase and apply critical thinking in each of these assignments.

Please make sure you cite within the text in APA format (6th edition)

**Final Exam:** 100 points, unlimited time and must be completed in one setting.

[PBHE501] Syllabus

Version History

Developed [1/28/15], 2015

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**Lab Assignment:** The biostatistics lab portion of this course will consist of five parts.

To complete this lab assignment, you may use Excel Analysis Tool Pak, Megastat or any appropriate statistical software or resource available to you.

Overview: As a public health personnel, you conducted a survey and collected economic and health data on households in a township that is known to have a high prevalence of heart disease. (See the Excel Household Data). The Household Data file contains data for 100 households surveyed including race, household income, family size, home price, number of bedrooms, and family history of heart disease.

Analyze the 100 survey responses and write a final report of your observation. Complete your report in a Word document, copying in the relevant output and graphics you need to support your report. Your final report must be a complete report describing your findings from the data to include parts 1 - 4. Your report should be in APA format.

**Lab Exercise Part 1: DUE WEEK 2**

**Lab Exercise Part 2: DUE WEEK 3**

**Lab Exercise Part 3: DUE WEEK 5**

**Lab Exercise Part 4: DUE WEEK 6**

**Lab Exercise Part 5: Final Lab Report DUE WEEK 7**

Your final report must be a complete report putting together and describing your findings from the analysis of the data from part 1 through part 4. Your report should be in APA format.

### Course Grading Outline

Grading Instrument		Percentage of Final Grade
Forum(7 @ 100 pts each)	700 pts	25%
Introductory Forum Post	10 pts	
Final Exam	100 pts	15%
Weekly Lab and Exercises		20%
EXERCISES (7 @ 100 pts each)	700 pts	
Biostatistics Lab Portion of Course		40%
Lab part 1	100 pts	
Lab part 2	100 pts	
Lab part 3	100 pts	
Lab part 4	100 pts	
Lab Part 5	500 pts	

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<b>TOTAL</b>	<b>2410 pts</b>	<b>100%</b>
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<b>Course Outline</b>					
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>1</b>	Measurements Types of Studies	Understand reasons for studying statistics  Distinguish between descriptive and inferential statistics, surveys and experiments, retrospective and prospective studies.  Evaluate the importance of sampling methods.  Examine differences between, populations and samples, parameters and statistics, and sampling methods.	Gertsman Chapters 1 & 2  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Understanding Measurements in Biostatistics	Week 1 Forums: -Introduction -Real World Use of Statistics
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>2</b>	<b>Frequency Distributions</b>  <b>Summary Statistics</b>	Differentiate between Qualitative and Quantitative Variables  Examine and Interpret various graphs and frequency tables  Evaluate measures of central tendency  Understand the difference between population and sample means and standard deviation.	Gertsman Chapters 3-4  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Understanding Means and Standard Deviations  Quiz 1: Chapters 1-4	Week 2 Forum: Using Data from the Real World: Assessment of Gulf War Syndrome
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>

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<b>3</b>	Probability Concepts  Probability Distributions	Distinguish between mutually exclusive events and independent events  Evaluate the importance of the normal distribution <hr/> Examine the properties of the normal distribution  Differentiate between the normal and the standard normal distributions <hr/>	Gertsman: Chapters 5- 7  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Understanding Normal Distributions  Lab Exercise Part 1: Preliminary Report	Week 3 Forum: Water Intake and Statistics
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>4</b>	Introduction to Statistical Interference  Hypothesis Testing  Independent Means	Evaluate and explain the concepts of central limit theorem and t-distributions  Assess a normal curve and understand its importance in statistical inference  Understand and apply sampling distribution and standard error of the mean concepts.  Examine the steps involved in hypothesis testing and each of its components	Gertsman: Chapters 8, 9, 11, and 12  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Understanding t distributions  Quiz 2 Chapters 2, 5, 6, 7, 8, 9, 12	Week 4 Forum: Case Study of Diet and Health
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>5</b>	Confidence Intervals	Assess when it is useful to test between means	Gertsman: Chapters 10 and 13	Lab Work Part 2	Week 5 Forum: Testing the Hypothesis

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	Comparing Several Means	Evaluate and formulate null and research hypotheses examining the differences between means.  Differentiate when nonparametric tests should be used. Understand the meaning and importance of F ratio.  Examine the output on t tests, 95% confidence intervals and ANOVA.	Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Understanding ANOVA in Public Health	
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>6</b>	Inferences about a Proportion  Comparing Porportions  Cross Tabulated Counts	Differentiate when correlations should be used.  Understand the meaning and importance of Pearson's r  Assess when regression analysis should be used Examine the meaning and importance of coefficients in the regression model.	Gertsman: Chapters 16-18  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Quiz Chapters 10, 13, 16, 17, and 18  Understanding Pearson's r in Public Health	Week 6 Forum: Proportions and Cross Tabulated Counts
<b>Lesson</b>	<b>Topic</b>	<b>Learning Goals</b>	<b>Reading(s)</b>	<b>Assignment(s)</b>	<b>Forum(s)</b>
<b>7</b>	Correlation  Regression  Multiple Linear Regression  Stratified 2 x 2 Tables	Examine research methodology for when logistic regression analysis should be used.  Understand the meaning and importance of confidence intervals for p value and regression coefficient	Gertsman: Chapters 14, 15, and 19.  Supplemental readings are provided in the course lesson  <b>Video Tutorials</b>	Final Lab Report  Understand the importance of p value	Application of Correlation and Regression to Public Health.

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		Examine the advantages and disadvantages of non-parametric methods.			
		Demonstrate an understanding between the basic purposes of correlation analysis and regression analysis			
Lesson	Topic	Learning Goals	Reading(s)	Assignment(s)	Forum(s)
8	Comprehensive Meaning of Statistics	Assess research questions and hypotheses  Evaluate appropriate statistical tests for different situations  Differentiate practical critiquing real life biostatistics  Evaluate statistically-oriented public health research articles with better understanding	Supplemental readings are provided in the course lesson	<b>Final Exam:</b> Complete by the end of week 8	N/A

Lesson	Video Tutorials
1	Data Distributions -- types of data Inference -- What is it? Sampling -- How to select valid samples Sampling -- Invalid Types Sampling -- Random Samples Sampling -- Valid Types
2	Bar Graph Dot plot Comparing two data distributions

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	Data Distributions -- calculating a trimmed mean Data Distributions - calculating mean and median Data Distributions - calculating range and interquartile range
<b>3</b>	Continuous probability distribution calculations Discrete probability distribution calculations Mean and standard deviations of a discrete probability distribution Sampling Distribution of Sample Proportion Normal Distribution -- Empirical Rule Normal Distribution -- Empirical Rule (example) Normal Distribution -- Finding data value given percentile
<b>4</b>	Central Limit Theorem Confidence intervals -- when can you use? Confidence intervals compare width of z with t Significance test for mean (sigma unknown) Significance test for mean (sigma unknown) using calculator
<b>5</b>	Significance test for mean (sigma known) Significance test for mean (sigma known) using calculator Significance test for mean (sigma unknown)
<b>6</b>	Chi-square confidence interval for population variance Chi-square confidence interval for population variance example Sign Test for a population Proportion using Calculator
<b>7</b>	Regression – Assumptions Regression -- Calculating Correlation Coefficient Regression -- Residual Plot Definitions and Properties Regression – Scatter plot Regression -- Test of Significance for Rho Population Correlation

## Policies

Please see the [Student Handbook](#) to reference all University policies. Quick links to frequently asked question about policies are listed below.

[Drop/Withdrawal Policy](#)

[Plagiarism Policy](#)

[Extension Process and Policy](#)

[Disability Accommodations](#)