

**Course Title:** Introduction to Biostatistics

**Course Number:** PHCO 0504

**Course Prerequisite(s):** Quantitative Skills Assessment

**Course Location:** Room 1A/1B, Rutgers School of Public Health Building, 683 Hoes Lane West, Piscataway, NJ 08854

**Course Date & Time:** Thursday, 6:00PM-8:00PM EST

**Course Instructor:** Jaya M. Satagopan, PhD,  
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**Office Hours:** **Mondays and Thursdays 5pm to 5:30pm**  
**Office Hours Location:** Zoom room (link posted under Zoom tab on Canvas)

**Course Assistant:** Nabil Husni, MS Student  
**Office Hours:** Wednesdays noon to 1pm  
**Office Hours Location:** Zoom room (link posted under Zoom tab on Canvas)

**Course Website :** [canvas.rutgers.edu](http://canvas.rutgers.edu)

**Recommended Course Text:** *Basic Biostatistics: Statistics for Public Health Practice*, Second Edition, B. Burt Gerstman, Jones & Bartlett Learning, © 2015, ISBN: 978-1-284-03601-5.

**This text is available electronically via Rutgers Library.**

**Additional/Supplemental Readings/Resources:** (Will be posted on Canvas)

- a) Estruch R, Ros E, Salas-Salvado J, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. *NEJM*. 2013; 368:1279-1290.
- b) Glanz, K et al. Measures of sun exposure and sun protection practices for behavioral and epidemiologic research." *Arch Derm*,. 2008; 144 217-222.
- c) Wells TS, LeardMann CA, Fortuna SO, et al. A prospective study of depression following combat deployment in support of wars in Iraq and Afghanistan. *AJPH*. 2010. 100(1):90-99.
- d) Halkitis PN, Kupprat SA, Hubbard McCree D, et al. Evaluation of the relativeness effectiveness of three HIV testing strategies targeting African American men who have sex with men (MSM) in New York City. *Ann Beh Med*. 2011; 43:361-369.
- e) Halkitis PN, Manasse A, McCready K Illicit drug use in a community-based sample of heteosexually-identified emerging adults. *J Ch Adol Sub Use*. 2010; 19:300-308.
- f) Engs RC, Hanson DJ, Diebold BA. The drinking problems and patterns of a national sample of college students, 1994. *J Alc Drug Ed*. 1997; 41:13-33.
- g) DeLongis A, Folkman S, Lazarus R. The impact of daily stress on health and mood; psychological and social resources as mediators. *J Pers Soc Psych*. 1988; 54:486-495.
- h) Palamar, JJ, Kiang MV, Halkitis PN. Predictors of stigmatization towards use of various illicit drugs among emerging adults. *J Psych Drugs*. 2012; 44:243-251.
- i) Bradley EH, Curry LA, Devers KJ. Qualitative data analysis for health services research: developing taxonomy, themes, and theory. *Hlth Svcs Rsch*. 2007:1758-1772.

- j) Colorafi KJ, Bronwynne E. Qualitative descriptive methods in health science research. *HERD*. 2016; 9(4):16-25.
- k) Sutton J, Zubin Austin A. Qualitative research: data collection, analysis, and management. *Can Jn Hosp Pharm*. 2015; 68 (23): 226-231.
- l) <https://www.cdc.gov/eis/field-epi-manual/chapters/collecting-data.html>
- m) Soucie MJ. Public health surveillance and data collection: general principles and impact on hemophilia care. *Hemat*. 2012; 17: s144-s146.
- n) Rothman N et al. A multi-stage genome-wide association study of bladder cancer identifies multiple susceptibility loci. *Nature Genetics*, 2010; 42:978-984.
- o) Garcia-Closas M et al. NAT2 slow acetylation and GSTM1 null genotypes increase bladder cancer risk: results from the Spanish Bladder Cancer Study and meta analysis. *The Lancet*, 2005; 366:649-659.
- p) Kricker A et al. MC1R genotype may modify the effect of sun exposure on melanoma risk in the GEM study. *Cancer Causes Control*, 2010; 21:2137-2147.

**Class Format:**

This course will use a **FLIPPED CLASSROOM** teaching model. In this teaching model, students are expected to have engaged with materials **before coming to class** using precise pre-class instructions. These materials are videos of lecture, podcasts or articles made available via Canvas. As part of viewing the lecture videos, students will be expected to answer a series of questions to better understand the materials and to better prepare for the classroom. Classroom time will focus on discussions of key topics from the lecture materials, interactive exploration of typical misconceptions, and collaborative problem solving with peers. You can watch the videos and answer the questions repeatedly any number of times.

**Online 30:**

**Viewing the lecture videos and answering the questions, listening to podcasts or reading articles BEFORE each class will constitute the Online-30 materials for this course.** The duration of the Online-30 videos for each lecture will be **at least** 30 minutes.

**PLEASE NOTE:**

- You **must** complete the Online 30 materials before coming to each class.
- You will do activities in class to learn foundational statistical concepts. These activities will be posted on Canvas. You **must** bring your laptop or any related device (for example, a tablet) to access these activities from Canvas during class. There is **absolutely no recommendation** for what kind of laptop or related device you need – the choice is entirely yours.

**Course Description:**

This course introduces biostatistical concepts and methods commonly encountered by public health professionals. Students are also expected to complete several computer-based exercises for this course.

**Competencies Addressed:**

1. Explain the role of quantitative methods and sciences in describing and assessing a population's health.
2. Select quantitative data collection methods appropriate for a given public health context.
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming, and software, as appropriate.
4. Interpret results of data analysis for public health research, policy, or practice.

**Course Objectives:**

- a. Understand the relationship between research questions, designs, and statistical analysis.
- b. Identify different levels of measurement (nominal, ordinal, interval, ratio) (categorical/nominal and continuous).

- c. Create displays of public health data (e.g. contingency tables, histograms, scatter-plots, etc.) for continuous and categorical/nominal data.
- d. Explain and compute measures of central tendency and dispersion for continuous data, and recognize of the strengths and limitations of each for descriptive purposes.
- e. Build and interpret confidence intervals for means and proportions.
- f. Understand the basic principles of hypothesis testing.
- g. Choose, execute and interpret appropriate parametric and non-parametric bivariable tests of association with categorical/nominal and continuous data.
- h. Recognize bivariable parametric and non-parametric tests of association with categorical/nominal and continuous data as they are applied in public health research, and think critically about those applications.
- i. Based on the type of variables utilized (categorical/nominal and continuous), identify the type of bivariable statistical analysis appropriate for answering specific questions and tests of associations.
- j. Consider how multivariable analyses are used in public health research when the dependent variable is continuous and when it is categorical, specifically dichotomous.
- k. Analyze and report findings from a large data set using parametric and non-parametric tests of association with nominal and continuous data.
- l. Explain how to analyze qualitative data.
- m. Interpret and explain research designs and statistical reported in public health and related health journals

Competency	Learning Objectives	Lessons	Assessment(s)
1	a, f, h, m	1, 3, 4, 10	Homework; Data Analysis Project
2	b-l	1-13	Homework; Exams 1, 2, and Final
3	c-l	2-9, 11-13	Homework; Data Analysis Project; Exams 1, 2, & Final
4	c, d, k, l, m	2-13	Homework; Exams 1, 2, & Final

**Course Requirements and Grading/Assessments:**

This course will strictly adhere to School of Public Health Honor Code (See the attached policy statement at the end of this syllabus). Complete all assignments – due dates are noted below. All these assignments will count towards your final grade. **Late assignments will not be accepted.**

1. Class Engagement:

You are expected to attend and actively participate in all class sessions and activities of this course. Missing a class can adversely impact your performance on homework, exams, and data analysis project. There are activities that we do in class which may not translate well to being made up outside of class. You are expected to come to class on time to prevent disrupting the lecture and classroom activities. You are also expected to complete the following surveys: School of Public Health Honor at the beginning of the semester, a mid-course survey, and an end-of-semester course evaluation.

**ATTENDANCE:** While attendance will not be graded, attendance will be taken during each class. Students absent for more than 2 classes during the semester will be asked to contact the Office of Student Affairs for remediation.

2. Online 30 (5 points):

Before attending each lecture, you will complete an Online 30 activity, which involves viewing a video describing statistical concepts and answering some questions included in the middle of or at the end of the video. This may be a single video or it may be broken up into several short videos for ease of engagement. The total duration of

the videos for each lecture will be **at least** 30 minutes. This course has 10 Online 30 engagements. You must complete viewing the video and answering questions **before each class**. Completing each Online 30 engagement will earn you 0.5 point, for a total of 5 points. When answering the questions associated with the videos, you will not be graded on whether your answer is correct. But viewing the video and answering all the questions will earn you 0.25 point per Online 30 engagement. **The Online 30 videos must be viewed and questions answered by no later than 9AM on the due date. You will not be able to follow the classroom activities if you do not complete the Online 30 activities.**

**3. Homework (40 points):**

For these assignments, you will be reading, analyzing, and discussing published public health research studies that demonstrate the research and statistical techniques we are studying in class. For these activities you are asked to read the research studies and then answer a set of questions pertaining to the studies or solve a set of problems prepared by your instructor. Research studies to read and related questions will be posted at Rutgers Canvas. **Assignments must be submitted on Canvas by no later than 9AM on the due date.** There are 10 required homework assignments, each worth 4 points. Due dates are shown in the adjacent table.

Assignment	Due Date
1	01/26/23
2	02/02/23
3	02/09/23
4	02/16/23
5	03/02/23
6	03/09/23
7	03/23/23
8	03/30/23
9	04/13/23
10	04/20/23

Scoring of the assignments may be interpreted as follows: 4 = Perfect; 3.5 = Excellent; 3 = Good; 2 = Fair; 1 = Poor; 0 = Not Submitted or Late.

**4. Data analysis paper (20 points):**

This assignment will be completed in 3 phases and will focus on the analysis of a dataset. Each student will complete a data analysis and prepare a structured abstract that includes a set of tables, figures and a summary based on precise instructions. This project will be completed in 3 phases. In each phase, each student will undertake specific data analysis task to answer a set of questions and write up the analyses in the format of a journal article, like the types you will read during the course.

Material	Due Date
Draft 1	02/16/23
Draft 2	03/30/23
Final Report	04/27/23

You will submit the **first draft** (Descriptive analyses) along with Homework 4 (on 02/16/23). You will receive feedback and edits. These edited materials and an additional set of analyses (bivariate analyses) will then constitute the **second draft**, which will be due along with Homework 8 (on 03/30/23). After draft two, you will again receive feedback and edits. The **final draft** of your project will include the edited version of draft two plus any additional set of analyses. The final draft is due on 04/27/23).

The final product will be a structured abstract and must be written in the style and format described to you via Canvas. You can conduct your data analysis using SPSS, the R programming language, or any other statistical software package of your choice. Detailed descriptions of the data analysis summary format and content to be included in each draft will be posted on Canvas. **Data analysis assignments must be submitted on Canvas by no later than 9AM on the due date.**

You must hand in both Draft 1 and Draft 2. You will receive 2.5 points simply for handing in each draft. In addition, you will receive feedback on each draft, which will help to improve the final draft.

The final report (which will be a structured abstract along with tables and figures) will be worth 15 points.

5. Examination 1(10 points): This will be a **take home exam**. The exam will consist of a set of short answer questions in which are asked you to explain, apply, interpret, and evaluate the concepts that you have studied. This also will include interpreting output from data analyses. The first exam will cover all the concepts up to and including hypothesis testing (Session 4). **The exam will be released after class on Thursday, February 16, 2023. It must be submitted on Canvas by 9AM on Tuesday, February 21, 2023.**

6. Examination 2 (10 points): This will also be a **take home exam**. The exam will consist of a set of short answer questions in which are asked you to explain, apply, interpret, and evaluate the concepts that you have studied. This also will include interpreting output from data analyses. This exam will cover all the concepts up to and including correlation (Session 9). **The exam will be released after class on Thursday, March 30, 2023. It must be submitted on Canvas by 9AM on Tuesday, April 4, 2023.**

7. Examination 3 – Finals (15 points): The final exam will also be a **take home exam**. The exam will consist of a set of short answer questions in which are asked you to explain, apply, interpret, and evaluate the concepts that we have studied. This will include interpreting output from data analyses. The final exam will cover all the concepts covered during the course with a particular emphasis on the material we studied after Exams 1 and 2. **The exam will be released at 8PM on Thursday, April 27, 2023. It must be submitted on Canvas by 8PM on Thursday, May 4, 2023.**

Assignment Point Allocation:

Online 30 Engagement	5.0 pts
Homework	40.0 pts
Data Analysis Draft 1	2.5 pts
Data Analysis Draft 2	2.5 pts
Data Analysis Final Summary	15.0 pts
Examination 1	10.0 pts
Examination 2	10.0 pts
Examination 3	<u>15.0 pts</u>
Total	100.0 pts

Grades Point Allocation:

94 – 100	A
90 – <94	A-
87 – <90	B+
84 – <87	B
80 – <84	B-
77 – <80	C+
70 – <77	C
<70	F

Please note that grades are calculated based on total number of points accrued and are not rounded.

**Course Syllabus:**

Session	Date	Topic	Online 30	Reading from Text Book	Assignment Due
1	January 19, 2023	Study Design, Measurement of Variables & Data Collection for Public Health	Lecture videos assigned via Canvas	Chapters 1-2	-
2	January 26, 2023	Summary Statistics, Distributions, & Central Limit Theorem	Lecture videos assigned via Canvas	Chapters 3-4	Homework 1
3	February 2, 2023	Confidence Intervals for Means & Proportions	Lecture videos assigned via Canvas	Chapters 10, 11, 16	Homework 2
4	February 9, 2023	Hypothesis Testing for Means & Proportions	Lecture videos assigned via Canvas	Chapters 8-9	Homework 3
5	February 16, 2023	Bivariable associations	Lecture videos assigned via Canvas	Chapter 12	Homework 4 + Data Analysis Draft 1
<b>Exam 1 released after class on Thursday, February 16, 2023 Due on Canvas by 9am on Tuesday, February 21, 2023</b>					
6	February 23, 2023	t tests	Lecture videos assigned via Canvas	Chapter 12	-
7	March 2, 2023	One-way ANOVA	Lecture videos assigned via Canvas	Chapter 13	Homework 5
8	March 9, 2023	One-way ANOVA: Post-hoc associations	Lecture videos assigned via Canvas	Chapter 13	Homework 6
<b>SPRING BREAK</b>					
9	March 23, 2023	Correlation	Lecture videos assigned via Canvas	Chapters 14.1-14.3	Homework 7
10	March 30, 2023	Chi-Square Test & Odds Ratio	Lecture videos assigned via Canvas	Chapter 18	Homework 8 + Data Analysis Draft 2
<b>Exam 2 released after class on Thursday, March 30, 2023 Due on Canvas by 9AM on Tuesday, April 4, 2023</b>					
11	April 6, 2023	Simple linear regression	Lecture videos assigned via Canvas	Chapter 14-15	-
12	April 13, 2023	Multivariable regression	Lecture videos assigned via Canvas	Chapter 14-15	Homework 9

13	April 20, 2023	Analysis of qualitative data	Lecture videos assigned via Canvas	Bradley et al; Colorafi & Bronwynne; Sutton & Austin	Homework 10
14	April 27, 2023	Putting it together – overview of hypothesis test and regression	Lecture videos assigned via Canvas	-	Final Data Analysis Project
<b>Final exam released 8PM on Thursday, April 27, 2023 Due on Canvas by 8PM on Thursday, May 4, 2023</b>					
15	May 4, 2023	<b>NO CLASS FINAL EXAM DUE BY 8PM ON CANVAS</b>			

Students are reminded free expression in an academic community is essential to the mission of providing the highest caliber of education possible. Provocative ideas respectfully presented are an expected result. An enlightened academic community, however, connects freedom with responsibility. Rutgers School of Public Health encourages civil discourse, reasoned thought, sustained discussion, and constructive engagement without degrading, abusing, harassing, or silencing others. The teachers for this course are committed to maintaining an environment that opens doors, opens hearts, and opens minds.

### **Minimum Grade Requirement for Select Prerequisite Courses**

PHCO 0504 Introduction to Biostatistics serves as a prerequisite course for many upper-level research and quantitative courses. Some of these upper-level courses require not only completion of PHCO 0504 but also require a minimum grade requirement (i.e., a grade of “B” or better) in PHCO 0504. Students who have completed the prerequisite course with the required minimum grade will be allowed to register for upper-level courses that require a minimum grade. Students who have completed the prerequisite course with a grade less than the required minimum grade should review the [Minimum Grade Requirement for Select Prerequisite Courses Policy](#) for more information. Students may review the Curriculum Worksheet for their concentration to learn which upper-level courses have a minimum grade requirement.

### **Learning Management System:**

Canvas will be used extensively throughout the semester for course syllabus, assignments, announcements, communication and/or other course-related activities. It is the student’s responsibility to familiarize themselves with Canvas and check it regularly. If you have difficulties accessing Canvas, please inform the instructor and Canvas Support ([help@canvas.rutgers.edu](mailto:help@canvas.rutgers.edu)). Canvas is accessible at [canvas.rutgers.edu](https://canvas.rutgers.edu).

### **School of Public Health Honor Code:**

The School of Public Health Honor Code is found in the student bulletin ([sph.rutgers.edu/academics/catalog/index.html](https://sph.rutgers.edu/academics/catalog/index.html)). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another’s work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the school community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

### **Students with Disabilities:**

Rutgers University welcomes students with disabilities into all of the University’s educational programs. In order to receive consideration for reasonable accommodations, a student must Apply for Services by first completing a Registration Form with the Rutgers Office of Disability Services (ODS) at [ods.rutgers.edu](https://ods.rutgers.edu). The student will also be required to participate in an ODS intake interview and provide documentation. If reasonable accommodations are granted, ODS will provide you with a Letter of Accommodations which should be shared with your instructors as early in your courses as possible.



**Graduate Student Computer Policy:**

Students are required to possess a personal laptop, no older than approximately two years, that must meet minimum requirements which may be found online at:

<https://sph.rutgers.edu/student-life/computer-requirements.html>

**Policy Concerning Use of Recording Devices and Other Electronic Communications Systems:**

When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.

**Withdrawal/Refund Schedule:**

Students who stop attending their course(s) without processing an [Add/Drop Course form](#) will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed [Leave of Absence form](#) from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at:

<https://sph.rutgers.edu/academics/policies.html>

**Special Circumstances During COVID-19 (For Fall 2021) (version of August 18, 2021):**

To keep our on-campus communities safe, compliance with all current guidance and policies as set forth in the [Guide to Returning to Rutgers](#) is required at all times and without exception. Students, faculty, staff, or visitors who do not comply with these policies will not be permitted to remain on-site. The use of face-coverings indoors \*IS\* required in classrooms and offices as well as shared spaces (such as hallways and bathrooms). Instructors may teach from behind the podium without a face-covering when the appropriate separation from seated students can be maintained but must use a face-covering when walking around the classroom or when talking in small groups with students. Rutgers employees and students must use the My Campus Pass symptom checker, a self-screening application, each day when traveling to campus or entering a Rutgers building. Please remember to wash your hands, wear a mask while indoors, particularly in crowded spaces and groups, and stay up-to-date on university guidance by consulting the [Guide to Returning to Rutgers](#) and the university's [COVID-19 website](#).

In addition, the School of Public Health recognizes that students may experience challenges or be negatively impacted due to the COVID-19 pandemic, mental and emotional health toll from systemic racism, altered personal and professional obligations, and other crises existing at the moment in our local, national, and global communities. Students are encouraged to discuss these challenges and circumstances with their instructor, if they feel they may need additional support or temporary accommodations at the beginning or during this course. The course instructor may consider making reasonable temporary adjustments depending on the student's situation. If additional support is needed, students may reach out to the [Office of Student Affairs](#) ([studentaffairs@sph.rutgers.edu](mailto:studentaffairs@sph.rutgers.edu)) or any of the appropriate referral resources listed on the [Student Connect Canvas page](#).