RUTGERS
School of Public Health

Course Title:	Introduction to Biostatistics
Course Number:	PHCO 0504
Course Date & Time:	Online; *Week starts on Mon – Week ends on Sun*
Course Instructor:	Brett Turner; Contact via Canvas Inbox
Office Hours:	Set appointment via Canvas Inbox

Course Description:

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

Required Course Text:

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

Optional Course Text:

Essential Biostatistics: A Nonmathematical Approach. Harvey Motulsky, Oxford University Press © 2015, ISBN: 9780199365067

Additional/Supplemental Readings/Resources will be posted on Canvas.

Weekly readings from these texts are assigned in the course schedule section of the syllabus. These readings are part of the course plan, and you are expected to perform the readings (*and re-read them as needed*) in order to achieve sufficient comprehension of topics to support the successful completion of weekly assignments and other assessments.

Course Format:

This is an ***asynchronous*** online course**:** Course work is performed across many remote class sessions that do not occur in a physical environment or at a specific time, students can work at their own pace. See the course syllabus for an overview of the course content schedule.

- Assignments are due weekly on Sunday (11:59pm).
- New course materials and assignments will be posted on Canvas weekly on Monday.

Spring 2023 Key Dates

Tue, Jan 17	First Day of Spring 2023 Semester
Sat, Mar 11 - Sun, Mar 19	Spring Recess
Mon, May 8	Last Day of Spring 2023 Semester

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Selected Concentration 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	Weeks	Assessment(s)
1	a,f,h,m	1-6	Research Reading Assignments; Data Analysis Paper; Quiz 1
2	b-l	2-4, 6-11	Research Reading Assignments; Quiz 1
3	c-l	3-15	Research Reading Assignments; Data Analysis Paper; Data Analysis Assignments
4	c,d,k,l,m	2-15	Research Reading Assignments; Data Analysis Assignments; Quiz 2 & 3

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.

Late assignments will not be accepted.

1. Class Participation (5 points):
You are expected to actively participate in all activities of this course. Your participation must occur within the designated timeframes for each course activity. Activities include performing independent readings, submitting weekly assignments, participating in group discussions, reviewing recorded lectures and supplementary materials, and other activities as described in weekly modules on Rutgers Canvas.

2. Research Reading Assignments (20 points):
For these assignments, we 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. Questions are posted at Rutgers Canvas. Due dates for research reading assignments are presented in the course schedule, and will be posted to Rutgers Canvas.

Scores are issued on the basis of correctness of responses, or otherwise as follows:
5 = Perfect; 4 = Excellent; 3 = Good; 2 = Fair; 1 = Poor; 0 = Not Submitted or Late

3. Weekly Data Analysis & Discussion Assignments (40 points)
These assignments will serve as an opportunity for you to perform the statistical analysis procedures that you are learning about each week in class. You will be provided with a dataset, and will be asked to perform specific analysis of the data using SPSS. In each assignment, you will be responsible for selecting variables which will enable the analysis, executing the analysis, and interpreting the results in discussion forum postings. Students will comment on at least one classmates posting to discuss the substantive meaning of the results. Prompts for weekly data analysis assignments will be posted on Rutgers Canvas. Due dates for data analysis & discussion assignments are presented in the course schedule, and will be posted to Rutgers Canvas.

All data analysis assignments are worth 5 points. Points for each assignment are allocated per individual assignment rubrics, or as follows:
20% for appropriate conceptualization + 40% for correct execution + 40% for correct interpretation.

4. Data Analysis Paper (20 points)
There will be one data analysis paper which will be completed in two phases – a planning phase (10pt), and an execution phase(10pt). You will need to conceive of a research question which can be answered through the analysis of available data. You will be responsible for the planning, execution, and analysis necessary to address your research question. This will include the generation of a testable hypothesis, summary of background information on the topic of study, variable selection, calculation of descriptive statistics, analysis of bivariate relationships between outcome & predictor variables, selection and application of appropriate statistical tests for testing your hypothesis, and interpretation of the results of statistical tests. More detailed instructions will be posted on Rutgers Canvas.

5. Quizzes 1, 2, 3 (15 points)
Quizzes will consist of a combination of multiple choice and short answer questions in which you are asked to explain, apply, interpret, and evaluate the concepts that we have studied. This also will include interpreting output from a data analysis. You are not asked to memorize or repeat any formulas. These quizzes are administered online via Rutgers Canvas, and must be completed within a specified amount of time.

Quizzes are administered at the end of each major section of the course. To prepare for quizzes, you should review previous readings, videos, assignments, and instructor feedback on your prior work.

Grading/Assessments

Assignment Point Allocation:

5.0 pts	Class Participation
15.0 pts	Quizzes
20.0 pts	Research Readings
20.0 pts	Data Analysis Paper
40.0 pts	Data Analysis/Discussion Assignments
100 pts	**Total**

Grades Point Allocation

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

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

Course Schedule

Part 1: Foundations in Research & Estimation

Week//Start	Topic	Text Readings	Assignments Due Sunday
Wk1 // Jan 16	Course On-boarding		*Honor Code Review* *Syllabus Review* *Meet with Instructor* *Intro Discussion*
Wk2 // Jan 23	Study Design//Research Questions//Measurement of Variables//From Sample to Population	Gertsman Ch1-2, 8	Import Data & Identify Variable Types (2.5pts) Research Reading #1
Wk3 // Jan 30	Calculating Summary Statistics for Variables of Different Types.	Gertsman Ch3-8	Calculate Summary Statistics (2.5pts) Research Reading #2
Wk4 // Feb 6	Distributions//Central Limit Theorem //Confidence Intervals for Means & Proportions	Gertsman Ch7, 10-11,16	Simulating Sampling Distributions & Conf Intervals
Wk5 // Feb 13	Quiz: Foundational Concepts	Catch up & Re-read Ch 1-11, 16	Quiz 1: Foundational Concepts

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Course Schedule (*continued*)

Part 2: Bivariate Analysis

Week//Start	Topic	Text Readings	Assignments Due Sunday
Wk6 // Feb 20	Hypothesis Testing	Gertsman Ch 9-10	Writing a Hypothesis Statement
Wk7 // Feb 27	T-test	Gertsman Ch11-12	Hypothesis Testing with Independent Samples T-test
Wk8 // Mar 6	One-way ANOVA, Post-Hoc Tests	Gertsman Ch 13	Hypothesis Testing with ANOVA & Post-hoc Tests
Wk9 // Mar 13	Spring Recess		Spring Recess
Wk10 //Mar 20	Chi-square Test & Odds Ratio	Gertsman Ch16-19	Hypothesis Testing with Chi-Square Test & Proportion Z-tests Research Reading #3
Wk11// Mar 27	Correlation & Linear Regression	Gertsman Ch14	Correlation & Regression
Wk12 // Apr 3	Quiz: Bivariate Analysis	Catch up & Re-read Ch 9-18	Data Analysis Paper pt1 Quiz 2: Bivariate Analysis

Part 3: Multivariate Analysis

Week//Start	Topic	Text Readings	Assignments Due Sunday
Wk12 // Apr 10	Intro to Multivariable Analysis	Gertsman Ch15	
Wk13 // Apr 17	Logistic Regression Multivariable Regression	Gertsman Ch15	Multiple Regression Model Research Reading #4
Wk14 // Apr 24	Multivariable Analysis Review	Catch up & Re-read	Quiz 3: Multivariate Analysis
Wk15 //May 1	Final Paper		Full Data Analysis Paper

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.

Course Policies

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 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@oit.rutgers.edu). Canvas is accessible at canvas.rutgers.edu.

School of Public Health Honor Code: The School of Public Health Honor Code is found in the School Catalog (sph.rutgers.edu/academics/catalog.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. 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.

Commitment to Safe Learning Environment: The Rutgers School of Public Health is committed to helping create a safe learning environment for all students and for the School as a whole. Free expression in an academic community is essential to the mission of providing the highest caliber of education possible. The School encourages civil discourse, reasoned thought, sustained discussion, and constructive engagement. Provocative ideas respectfully presented are an expected result. An enlightened academic community, however, connects freedom with responsibility. The School encourages all students to disclose any situations where you may feel unsafe, discriminated against, or harassed. Harassment or discrimination of any kind will be not tolerated and violations may lead to disciplinary actions.

Student Well-Being: The School of Public Health recognizes that students may experience stressors or challenges that can impact both their academic experience and their personal well-being. If the source of your stressors or challenges is academic, 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. For personal concerns or if additional support is needed, students may reach out to the [Office of Student Affairs](#) or any of the appropriate referral resources listed on the [SPH Student Connect](#) Canvas page.

Reporting Discrimination or Harassment: If you experience any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. You may report such incidents to the RBHS Title IX Office or to the School of Public Health's Office of Student Affairs. Rutgers University has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. If you experience any other form of discrimination or harassment, including racial, ethnic, religious, political, or academic, please report any such incidents to the School's Office of Student Affairs. The School strongly encourages all students to report any incidents of discrimination or harassment to the School. Please be aware that all Rutgers employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers as listed in Appendix A to Policy 10.3.12) are required to report information about such discrimination and harassment to the School and potentially the University. For example, if you tell a faculty or staff member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty or staff member must share that information with the RBHS Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can find a list of resources in Appendix A to University Policy 10.3.12. For more information about your options at Rutgers, please visit Rutgers Violence Prevention and Victim Assistance.

Overview of School Policies: Academic and non-academic policies and procedures, such as Auditing a Course, Retaking Courses, Grade Grievance and others that cover registration, courses and grading, academic standing and progress, student rights and responsibilities, graduation and more may be found under Policies on the School of Public Health website. Below are select specific policies; however, students are responsible for keeping informed about academic and non-academic policies and procedures beyond those noted on this syllabus.

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: sph.rutgers.edu/student-life/computer-support.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.

Policy Concerning Use of Turnitin: Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.

Withdrawal/Refund Schedule: Students who stop attending their course(s) without submitting a completed 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: sph.rutgers.edu/academics/academic-calendar.html