RUTGERS
School of Public Health

Course Title: Introduction to Biostatistics

Course Number: PHCO 0504

Course Location: 1 Riverfront Plaza (Newark Campus), Room 1005

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

Course Instructor: Perry Halkitis, MPH, MS, PhD, Dean & Professor perry.halkitis@rutgers.edu;
732.235.9700 (Newark)
Office Hours: M 500-530PM & TH 430-530 (Newark)

Course Assistant: Nicole Jones
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https://groupme.com/join_group/56577837/sFRD9dRY (GroupMe Link)
Support/Recitation Hours: Tuesdays 5 00-6 :00PM & 2nd Day TBD
Office Hours:

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.

Additional/Supplemental Readings/Resources: (Posted on Canvas)

Bradley EH, Curry LA, Devers KJ. Qualitative data analysis for health services research: developing taxonomy, themes, and theory. *Hlth Svcs Rsch.* 2007:1758-1772.

Colorafi KJ, Bronwynne E. Qualitative descriptive methods in health science research. *HERD.* 2016; 9(4):16-25.

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.

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.

Estruch R, Ros E, Salas-Salvado J, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. *NEJM*. 2013; 368:1279-1290.

Glanz, K et al. Measures of sun exposure and sun protection practices for behavioral and epidemiologic research." *Arch Derm,. 2008;* 144 217-222.

Hedberg K & Maher J. Collecting data. *The CDC Field Epidemiology Manual*. https://www.cdc.gov/eis/field-epi-manual/chapters/collecting-data.html

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.

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.

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.

Ranganathan P, Pramesh S, Aggarwal R. Common pitfalls in statistical analysis: Logistic regression. *Persp Cllin Rsch.2017;* 8:148.

Soucie MJ. Public health surveillance and data collection: general principles and impact on hemophilia care. *Hemat. 2012;* 17: s144-s146.

Sutton J, Zubin Austin A. Qualitative research: data collection, analysis, and management. *Can Jrn Hosp Pharm.* 2015; 68 (23): 226-231.

Valera P, Bachman L, Rucker AJ.. A qualitative study of smoking behaviors among newly released justice-involved men and women in New York City. *Health & Soc Wrk.* 2016; 41(2)2:121-128.

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.

Online 30:
Listen to podcasts, watch videocasts or read articles listed below **BEFORE** each class:
1. *Florence Nightingale – recognizing the nurse statistician*. BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/p07b8c95
2. *Missing women from drug trials.* BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/p07hb833
3. *Heart deaths, organized crime and gender data gaps*. BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/m00050rd
4. *The best stats you've ever seen*. Ted Talk by Hans Rosling. https://www.ted.com/talks/hans_rosling_the_best_stats_you_ve_ever_seen?referrer=playlist-the_best_hans_rosling_talks_yo
5. *Forecasting rain, teabags, voter ID trials*. BBC Radio4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/b0b3fz4c
6. *Sir Michael Marmott*. BBC Radio 4 Podcast – The Life Scientific. https://www.bbc.co.uk/sounds/play/b016ld4q
7. *Interesting People #803: "Malcolm C. Pike, Ph.D"* https://www.youtube.com/watch?v=jijm8iBQl5o
8. *Gender pay gaps and how to learn a language.* BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/b09m198x
9. *The Replication Crisis*. BBC Radio 4 Podcast – Analysis https://www.bbc.co.uk/sounds/play/m00013p9 [The 4 materials below introduce you to some of architects of modern statistics and epidemiology who gave us important statistical/epidemiological methods including ANOVA]
10. *Edith Abbott and crime statistics*. BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/p07s22lh
11. *Eminent statistician David Blackwell has died at 91*. By Robert Sanders, Berkeley News https://news.berkeley.edu/2010/07/15/blackwell/
12. *Tales from the century: Janet Lane-Claypon and epidemiology*. https://mrc.ukri.org/news/blog/tales-from-the-century-janet-lane-claypon-and-epidemiology/?redirected-from-wordpress
13. *Sir Richard Doll*. The Guardian https://www.theguardian.com/news/2005/jul/25/guardianobituaries.obituaries
14. *Spurious Correlations*. BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/p0201hpg
15. *Spurious correlations: Margarine linked to divorce?* BBC news article by James Fletcher. https://www.bbc.com/news/magazine-27537142
16. *Why do men and women vote differently?* BBC Radio 4 Podcast – Analysis https://www.bbc.co.uk/sounds/play/b00r5g6x
17. Golbeck AL (2017). *How one woman used regression to influence the salaries of many*. Significance Magazine, The Royal Statistical Society. https://rss.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1740-9713.2017.01092.x
18. *Rounding up the weed killer cancer conundrum.* BBC Radio 4 Podcast – More or Less: Behind the Stats https://www.bbc.co.uk/sounds/play/p075mwd3
19. *Our Slough focus group on the economic downturn*. BBC Radio 4 – Today https://www.bbc.co.uk/sounds/play/p0196q0d

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.

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	Leaning Objectives	Lessons	Assessment(s)
1	a, f, h, m,	1, 3, 4, 10	Research Reading Assignments; Data Analysis Project
2	b-l	1-13	Research Reading Assignments; Exam 1, 2, and Final
3	c-l	2-9, 11-13	Research Reading Assignments; Data Analysis Paper; Exams 1, 2, & Final
4	c, d, k, l, m	2-13	Research Reading Assignments; Exams 1, 2, & Final

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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 attend and actively participate in all class sessions and activities of this course. You are also expected to complete all readings including the Online 30. These will be included in our class discussions. If you cannot attend a session, it is your responsibility to notify the instructor ahead of the session to be missed. All other absences will be considered unexcused and will impact the final grade. You are expected to come to class on time to prevent disrupting the lecture and classroom activities.

2. Research reading assignments (40 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. We also will be discussing each of these articles thoroughly in class sessions. **Assignments must be submitted on Canvas no later than 9AM on the due date**. There are 8 required assignments. Due dates are shown in the adjacent table:

Assignment	Due Date
1	01/30/20
2	02/06/20
3	02/13/20
4	03/12/20
5	03/26/20
6	04/16/20
7	04/23/20
8	05/07/20

All assignments are worth 5 points. The Practice Assignment must also be submitted but will not be scored for a grade. Scoring of the assignments is as follows: 5 = Perfect; 4 = Excellent; 3 = Good; 2 = Fair; 1 = Poor = D; 0 = Not Submitted or Late

3. Data analysis paper (20 points):
This is a group assignment, which will be completed in three phases and will focus on the analysis of a data set. In each phase, you will undertake data analyses to answer a set of questions and write up the analyses in the format of the results section of a journal article, like the types we will be reading in class. The assignments will build on each other. Thus you will undertake and report a set of analyses for Draft 1 (Descriptive analyses). Then you will receive feedback and edits. These edited analyses and an additional set of analyses (Bivariable analyses) will then constitute Draft 2. After Draft 2 you will again receive edits and feedback. The final draft (Draft 3) will include the edited version of Draft 2 plus an additional set of analyses (Multivariable analyses). The final product must be written in the style and format of the results sections as shown in the journal articles we have been reading and analyzing in class throughout the semester. You will be learning how to conduct these analyses using SPSS. The final product must also include a signed statement of work, which indicates what each member of the team has contributed to the final product.

Draft	Due Date
Draft 1	02/27/20
Draft 2	04/09/30
Draft 3 (Final Draft)	04/30/20

Analyses to included in each draft are posted on Canvas. **Assignments must be submitted on Canvas for the entire group 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 draft will be worth 20 points. Scoring for the final draft is as follows: 15 = Perfect; 14-14 = Excellent = A; 12-13 = Good = B; 10-11 = Fair = C; < 10 = Poor = D; 0 = Not Submitted or Late.

4. <u>Examination 1(10 points):</u> The first examination will be taken in class. 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 also will include interpreting output from a data analyses. You are not asked to memorize and repeat any formulas. You may bring one page 8/5x11 sheet of paper to the class with notes that you can use during the course of the exam. You will have the entire class session of 02/20/20 to complete the exam. The first exam will cover all the concepts up to and including hypothesis testing (Session 4).

5. <u>Examinations 2 (10 points):</u> The second examination will be taken at home. 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 may also will include interpreting output from a data analyses. The exam will be released after class on April 9th and is due on April 13th at 9AM. The responses to the exam must be submitted on Canvas by 9AM. The second exam will cover all the concepts up to and including Session chi-square with and emphases on the material covered from the February 27th – April 9th sessions.

6. <u>Examination 3 (15 points):</u> The third examination will be taken in class. 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 a data analyses. You are not asked to memorize and repeat any formulas. You may bring one page 8/5x11 sheet of paper to the class with notes that you can use during the course of the exam. You will have the entire class session of 05/07/20 to complete the exam. The final exam will cover all the concepts covered during the course with a particular emphasis on the material we studied after the midterm.

Assignment Point Allocation:

Research Readings	40.0 pts
Data Analysis Draft 1	2.5 pts
Data Analysis Draft 2	2.5 pts
Data Analysis Paper Final	15.0 pts
Examination 1	10.0 pts
Examination 2	10.0 pts
Examination 3	15.0 pts
Class Participation	5.0 pts
Total	100 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.

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Course Schedule:

Session	Date	Topic	Online 30	Readings	Assignments Due
1	January 23	**Study Design, Measurement of Variables & Data Collection for Public Health**	Items 1-2	CH 1-2	
2	January 30	**Summary Statistics, Distributions, & Central Limit Theorem**	Items 3-4	CH 3-4;	Research Reading 1
3	February 6	**Confidence Intervals for Means & Proportions**	Item 5	CH 10, 11, 16	Research Reading 2
4	February 13	**Hypothesis Testing for Means & Proportions**	Item 6	CH 8-9	Research Reading 3
	February 20	**Examination 1 (in class)**			
5	February 27	**Bivariable Associations: Overview**	Item 7		Data Analysis Paper Draft 1
6	March 5	**t-test**	Item 8	CH 12	
7	March 12	**One-way ANOVA**	Item 9	CH 13	Research Reading 4
	March 19	**No Class (Spring Break)**			
8	March 26	**One-way ANOVA & Post Hoc Tests**	Items 10-13	CH 13	Research Reading 5
9	April 2	**Correlation**	Items 14-15	CH14.1-14.3	
10	April 9	**Chi-square Test & Odds Ratio**	Item 16	CH 18	Data Analysis Paper Draft 2
	April 13	**Examination 2 (take home)**			
11	April 16	**Regression: Linear**	Item 17	CH14-15	Research Reading 6
12	April 23	**Regression: Binary Logistic**	Item 18	CH 14-15; Ranganathan et al.	Research Reading 7
13	April 30	**Analysis of Qualitative Data**	Item 19	Bradley et al; Colorafi & Bronwynne; Sutton & Austin	Final Data Analysis Paper
14	May 7	**Examination 3 (in class)**			Research Reading 8

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.

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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). Canvas is accessible at 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). 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.

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_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: sph.rutgers.edu/academics/registration/school_calendars.html