PURDUE UNIVERSITY | Department of Public Health

PUBH 601: Introduction to the Quantitative Methods of Public Health

Purdue University, Fall 2023
Distance delivery, 8-week course
3 credit hours, 15-20 hours per week

Instructor: Mike Reger
Preferred Pronouns: he, him
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Virtual Office Hours: by appointment
How to contact the instructor: email

Course Description

The main goals of the course are to acquaint students with the basic concepts and methods of statistics, their applications, and their interpretation as used in public health. Students will learn basic terminology and its meaning, how to calculate various statistical measures and indices, how to quantify health relationships and how to compute and interpret inferential statistical techniques. Students will also acquire the ability to utilize the statistical software package SPSS as a tool to facilitate the processing, editing, storing, displaying, analysis, and interpretation of health research-related data.

Prerequisites

It is an expectation that you have proficiency in completing computer-related tasks such as browsing the internet, creating Microsoft PowerPoint (electronic) presentations, creating, and editing existing Microsoft Word documents, uploading and downloading documents to the course website and saving electronic files to the appropriate directory. These skills are prerequisites for this course.

Learning Outcomes

CEPH Foundational Competencies

Our Master of Public Health (MPH) program is accredited by the Council on Education for Public Health (CEPH). CEPH has identified 22 Foundational Competencies. These competencies are informed by the traditional public health core knowledge areas (biostatistics, epidemiology, social and behavior sciences, health services administration, and environmental health sciences), as well as cross-cutting and emerging public health areas. Listed below are the Foundational Competency expectations for students completing this course:

> 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.

In addition to the Foundational Competencies outlined above, this course also fulfills the following Foundational Knowledge Learning Objectives as defined by CEPH:

> 3: Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health.

Course Outcomes

- Describe the roles biostatistics serves in the discipline of public health.
- Use standard statistical terminology and symbols.
- Apply basic concepts of probability, random variation, and commonly used statistical probability distributions.
- Evaluate and select appropriate statistical techniques to investigate public health problems.
- Apply descriptive techniques commonly used to summarize public health data.
- Determine preferred methodological alternatives to commonly used statistical methods when assumptions are not met.
- Conduct analysis with statistical software.
- Apply common statistical methods for inference.
- Distinguish among the different measurement scales and the implications for selection of statistical methods to be used based on these distinctions.
- Interpret results of statistical analyses found in public health studies.
- Create written and oral presentations based on statistical analyses
- Develop research questions that can be answered with quantitative data.

Learning Resources, Technology & Texts

Required Texts

The required textbook for this course is *Heather M. Bush. (2012). Biostatistics: An Applied Introduction for the Public Health Practitioner (1st Edition). ISBN-13: 978-1111035143 ISBN-10: 1111035148*.

Students can purchase their copy or access an electronic copy on the Purdue Libraries website. There is a limited number of users who can access the electronic version provided by Purdue University at the same time. To ensure ease of access, students can download sections of the textbook for offline use.

Additional required readings will be posted on Engage.

Required Software

In this course, students will be required to use SPSS. To access the software at no cost, students will need to connect to the Software Remote system (goremote.itap.purdue.edu) using their Purdue username and password and make sure the domain is boilerad.

Once logged on, students will be asked to select one of the following two options: 1. to detect and install Citrix Receiver or 2. to use Citrix Lite version.

Downloading and installing Citrix Receiver is free and provides optimum performance of Software Remote. Students will see accessed software in their Windows Start menus although no software has actually been downloaded to their personal computer. If the lite version of Citrix is used, software will be available via web browser.

If you experience any technical difficulties, you can contact ITaP Customer Service Center by email: itap@purdue.edu or consult their Self Help Knowledge Base at: http://www.purdue.edu/goldanswers.

Course Structure

This course is organized into eight, self-paced, weekly modules. Each weekly module includes readings, labs assignments, discussions, interactive assignments, and quizzes. Students are expected to complete each weekly activity as outlined in the instructions. You will have a final project due at the end of the course. Weeks begin on Monday (day 1) and end on Sunday (day 7). Due dates are listed as module days in each assignment.

Assignments

Assignments	*% of Total Grade*
Final Project	35
Discussions	25
Lab Assignments (Weeks 2-7)	20
Quizzes (Weeks 2-8)	15
Other Assignments	5

Discussions

The purpose of the weekly Discussions are to allow you to learn through sharing ideas and experiences as they relate to course content and the discussion question. You are expected to post at least twice each week in response to forum questions on the week's topic. Because this is an online course, the discussion portion is an important way to exchange ideas with your classmates. You will be graded on your participation, relevance, and quality of your posts. The posts will take time to complete but they are an essential part of this course and a great way to get to know your colleagues.

Lab Assignments

The lab assignments are an important part of this course. These need to be written in a professional style. You will be required to have access to SPSS software in order to complete the lab assignments. Interpretations of statistical and substantive significance will be expected. Typed lab assignments are due at the end of each week. Assignments must be clearly written (so the instructor does not need to search for answers) to receive full credit.

Quizzes

The quizzes given in this course consists of questions carefully designed to help you self-assess your comprehension of the information presented on the topics covered in the module. All quizzes will either be multiple choice or True/False. You will have short (typically 10 question) quizzes based on lectures and required readings. You can use any resources to answer these questions.

Final Project

The course will lead to the completion of a final project that will be presented during the final week of class as a Microsoft PowerPoint presentation. Leading up to this project, as part of lab, students will complete lab assignments that include how develop research questions and how to carry out statistical tests using SPSS software. The final project will include 2-3 research questions that will be developed by you, along with a description of the study methods (i.e., study design, sampling procedures, and measures/variables, statistical test used), as well as the overall significance of your final project's results to public health. More details about the final project will be given at a later date.

Assignments	Due date and time	Points	Grade Category
Week 1 Discussion: Class Video Introductions	Initial post Wednesday, Week 1 by 11:59 PM ET Peer responses by Saturday, Week 1 by 11:59 PM ET	5	Discussion
Week 1 Assignment #1: Explore a Dataset	Sunday, Week 1 by 11:59 PM ET	10	Other
Week 1 Assignment #2: SPSS Introduction	Sunday, Week 1 by 11:59 PM ET 10	10	Other
Week 2 Discussion	Initial post Wednesday, Week 2 by 11:59 PM ET Peer responses by Saturday, Week 2 by 11:59 PM ET	5	Discussion
Week 2 Lab Assignment #1: Central Tendency & T-tests	**Part 1:** Wednesday, Week 2 by 11:59 PM ET **Part 2:** Sunday, Week 2 by 11:59 PM ET	10	Lab Assignments
Week 2 Quiz	Sunday, Week 2, by 11:59 PM ET	10	Quizzes
Week 3 Discussion: Reliability vs. Validity	Initial post Wednesday, Week 3 by 11:59 PM ET Peer responses by Saturday, Week 3 by 11:59 PM ET	5	Discussion
Week 3 Lab Assignment #2: ANOVA	Sunday, Week 3 by 11:59 PM ET	10	Lab Assignments
Week 3 Quiz	Sunday, Week 3, by 11:59PM ET	10	Quizzes
Week 4 Discussion	Initial post Wednesday, Week 4 by 11:59 PM ET Peer responses by Saturday, Week 4 by 11:59 PM ET	5	Discussion
Week 4 Lab Assignment #3: Correlation & Simple Linear Regression	Sunday, Week 4 by 11:59 PM ET	10	Lab Assignments
Week 4 Quiz	Sunday, Week 4, by 11:59PM ET	10	Quizzes
Week 5 Discussion	Initial post Wednesday, Week 5 by 11:59 PM ET Peer responses by Saturday, Week 5 by 11:59 PM ET	5	Discussion
Week 5 Lab Assignment #4: Multiple Linear Regression	Sunday, Week 5 by 11:59 PM ET	10	Lab Assignments
Week 5 Quiz	Sunday, Week 5, by 11:59PM ET	10	Quizzes
Week 6 Discussion	Initial post Wednesday, Week 6 by 11:59 PM ET Peer responses by Saturday, Week 6 by 11:59 PM ET	5	Discussion
Week 6 Lab Assignment #5: Odds Ratio & Chi-Square	Sunday, Week 6 by 11:59 PM ET	10	Lab Assignments

Week 6 Quiz	Sunday, Week 6, by 11:59PM ET	10	Quizzes
Week 7 Discussion:	Initial post Wednesday, Week 7 by 11:59 PM ET Peer responses by Saturday, Week 7 by 11:59 PM ET	5	Discussion
Week 7 Lab Assignment #6: Multiple Logistic Regression	Sunday, Week 7 by 11:59 PM ET	10	Lab Assignments
Week 7 Quiz	Sunday, Week 7, by 11:59PM ET	10	Quizzes
Week 8 Discussion: Qualitative Analysis	Initial post Wednesday, Week 8 by 11:59 PM ET Peer responses by Saturday, Week 8 by 11:59 PM ET	5	Discussion
Week 8 Quiz	Sunday, Week 8, by 11:59PM ET	10	Quizzes
Week 8 Final Project	**Friday**, Week 8 by 11:59 PM ET	100	Final Project

Grading Policies

Grading scale

Assignment of the final letter grade for the course will be calculated as follows.

A, A+	94-100%	B-	80-83%	D+	67-69%
A-	90-93%	C+	77-79%	D	64-66%
B+	87-89%	C	74-76%	D-	60-63%
B	84-86%	C-	70-73%	F	<60%

****So there will be no misunderstandings: I will NOT give additional points towards your final grade. In other words, an 89.5% or an 89.999% is a B+, etc.**

Course Schedule

Week	Topics	Reading/Videos
Week 1	Introduction to Biostatistics, SPSS, and Research	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning. • Pgs. Xxi-xxv **Articles** • Chen, H., Hailey, D., Wang, N., & Yu, P. (2014). A review of data quality assessment methods for public health information systems. International journal of environmental research and public health, 11(5), 5170-5207. http://www.mdpi.com/1660-4601/11/5/5170/htm • Nass, S. J., Levit, L. A., & Gostin, L. O. (2009). The value, importance, and oversight of health research. https://www.ncbi.nlm.nih.gov/books/NBK9571/?report=reader • Sieber, W. K., Green, T., & Williamson, G. D. (2006). Statistics and public health at CDC. MMWR, 55 (Supl 2), 22-4. https://www.cdc.gov/mmwr/preview/mmwrhtml/su5502a9.htm **SPSS Tutorial Readings** • SPSS: What Is It? https://www.spss-tutorials.com/spss-what-is-it/ • SPSS For the Classroom: The Basics https://www.ssc.wisc.edu/sscc/pubs/spss/classintro/spss_students1.html **Videos/Media** • The Importance of Data to Public Health and Health Care Collaborations https://www.youtube.com/watch?v=M3vqgrkVlTE • Introduction to Public Health Surveillance https://www.youtube.com/watch?v=kATQimRXcs4 • Big Data for the Common Good: Nitesh Chawla at TEDxUND https://www.youtube.com/watch?v=eBJmj2cJrpE • Data: the pathway to a better world | Gorjan Jovanovski | TEDxSittardGeleen https://www.youtube.com/watch?v=GQOmyKwhd4I.
Week 2	Descriptive Statistics and Comparing Means	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning. • Pgs. 1-73 **Articles** • Burgun, A., Bernal-Delgado, E., Kuchinke, W., van Staa, T., Cunningham, J., Lettieri, E., ... & Chène, G. (2017). Health Data for Public Health: Towards New Ways of Combining Data Sources to Support Research Efforts in Europe. Yearbook of medical informatics, 26(01), 235-240. https://www.researchgate.net/profile/FranciscoEstupinan_Romero/publication/320029395_Health_Data_for_Public_Health_Towards_New_Ways_of_Combining_Data_Sources_to_Support_Research_Efforts_in_Europe/links/59d24d9e4585150177f63081/Health-Data-for-Public-Health-Tow ards-New-Ways-of-Combining-Data-Sources-to-Support-Research-Efforts-in-Europe.pdf • Walport, M., & Brest, P. (2011). Sharing research data to improve public health. The Lancet , 377 (9765), 537-539. http://www.resourcenter.net/images/CSE/Files/2012/AnnMtg/Handouts/03_Lancet_SharingResearchDataToImprovePublicHealth.pdf **Videos/Media** • Stats information: Measure of Central Tendency https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-center-distrib utions/v/statistics-intro-mean-median-and-mode • Measure of Central Tendency

		https://study.com/academy/lesson/mean-median-mode-measures-of-central-tendency.html • Types of Data https://www.youtube.com/watch?v=LPHYPXBKks https://www.youtube.com/watch?v=hZxnzfnt5v8 • SPSS and Independent T-Tests https://www.youtube.com/watch?v=oIpzdTc0reI • SPSS and Paired T-Tests https://www.youtube.com/watch?v=MJGk2sg4EZU
Week 3	Multiple Group Studies and Power Analysis	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning. • Pgs. 73-87 **Articles** • Austin, S. B., Melly, S. J., Sanchez, B. N., Patel, A., Buka, S., & Gortmaker, S. L. (200 Clustering of fast-food restaurants around schools: a novel application of spatial statistics to the study of food environments. American Journal of Public Health, 95 (9), 1575-1581. https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2004.056341 • Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in US public health research: concepts, methodologies, and guidelines. Annual review of public health, 18 (1), 341-378. https://www.annualreviews.org/doi/pdf/10.1146/annurev.publhealth.18.1.341 **Videos/Media** • ANOVA and SPSS https://www.youtube.com/watch?v=jYn5Jv7Gh4 s • ANOVA and SPSS https://www.youtube.com/watch?v=iI__Q5njIW0 • Power Analysis and Sample Size https://www.youtube.com/watch?v=TrbVti5Wxlg
Week 4	Correlations and Simple Linear Regression	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner, Clifton Park, NY: Delmar Cengage Learning. • Pgs. 89-117 **Videos/Media** • Introduction to Linear Regression https://www.youtube.com/watch?v=zPG4NjIkCjc • Linear Regression and SPSS Part 1 https://www.youtube.com/watch?v=0AGLdgUtIJg • Linear Regression and SPSS Part 2 https://www.youtube.com/watch?v=VEQPX6d-EQw • Pearson Correlation and SPSS https://www.youtube.com/watch?v=VOI5IlHfZVE
Week 5	Multiple Linear Regression	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning. • Pgs. 118-149 **Videos/Media** • Introduction to Multiple Linear Regression https://www.youtube.com/watch?v=AkBjJ6OunR 4 • Multiple Linear Regression-The Basics https://www.youtube.com/watch?v=dQNpSa-bq4 M • Multiple Linear Regression Output https://www.youtube.com/watch?v=AMqB0K5Tt 6M
Week 6	Measures of Association and Chil Square	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning.

		• Pgs. 153-196 **Articles** • How to write a research plan http://www.uta.fi/cmt/en/doctoralstudies/apply/Tutkimussuunnitelmaohjeet_EN[1].pdf • How to write a research plan http://www.ifcc.org/media/410323/05_Research_Guide_IFCC.pdf **Videos/Media** • Odds Ratio-How to Calculate https://www.youtube.com/watch?v=5zPSD_e_N 04 • Understanding Confidence Intervals https://www.youtube.com/watch?v=tFWsuO9f74 o • Pearson's Chi Square Statistics https://www.youtube.com/watch?v=2QeDRsxSF 9M
Week 7	Logistic Regression	**Textbook** Bush, H. M. (2012). Biostatistics: An applied introduction for the public health practitioner. Clifton Park, NY: Delmar Cengage Learning. • Pgs. 197-230 **Articles** • Sperandei, S. (2014). Understanding logistic regression analysis. Biochemia Medica , 24 (1), 12–18. http://doi.org/10.11613/BM.2014.003 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3 936971/pdf/biochem-24-1-12-4.pdf • How do I interpret odds ratios in logistic regression? http://www.ats.ucla.edu/stat/mult_pkg/faq/gener al/odds_ratio.htm **Videos/Media** • Introduction to Logistic Regression https://www.youtube.com/watch?v=zAULhNrnuL 4 • Logistic Regression https://www.youtube.com/watch?v=gNhogKJ_q7 U
Week 8	Qualitative Analysis	**Articles** • Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: interviews and focus groups. British Dental Journal, 204 (6), 291-295. • Taylor-Powell, E. & Renner, M. (2003). Analyzing qualitative data. Program Development & Evaluation. • Kawulich, B. (2005). Participant observation as a data collection method. FQS, 6 (2). • Shields, L. (2003). The difference between quantitative and qualitative research. Pediatric Nursing 15 (9).

How to Succeed in This Course

- **Have consistent access to a computer that is connected to the internet, installed with a word processing and a presentation program (like Microsoft Office, Mac Pages/Keynote, or Open Office), and equipped with a microphone and speakers.** This is a 100% web-based course and must be accessed via Engage using your university ID. You must know how to use your computer, its programs, and the internet to complete assignments as directed. Get help if you need it.
- **Complete all assigned readings.** Your assignments are based heavily on course readings. Be sure to complete each of the required readings prior to beginning your weekly assignments.
- **Follow instructions for completing and submitting your assignments.** Take the time to read and fully understand the assignments before starting them. Ask questions if you are unclear about instructions. Submit your assignments as directed and on time (see Late Policy below).
- **Be able to use Engage.** All assignments must be uploaded to Engage correctly and on time as per the assignment instructions. If you are unfamiliar with Engage or have technical issues, get assistance.
- **Submit original work that cites sources correctly.** All of the work you submit for this course must be your original writing (written by you specifically and only for this course). Any information in your submissions that is paraphrased or quoted must be cited correctly in APA style (see Course Resources section below for help with APA citation guidelines). I maintain a very strict plagiarism policy. Please read the Student Conduct and Academic Integrity policy carefully.
- **"Show up" for class.** Plan to log in to the course page at least three times per week to review and submit assignments, participate in discussions, and check for announcements. Keep up with your reading. Submit your assignments as directed. Ask questions when you need help. For a typical three credit hour course, you are expected to put in approximately six to nine hours of work per week. Plan your schedule accordingly.
- **Submit work that demonstrates masters-level writing.** Because this is an online course, the majority of your assignments are written. You are expected to demonstrate your ability to write at the university level. If you need writing help, seek assistance from the Writing Center (see Course Resources section)

Policies

Course Participation
Students are expected to participate in every week of the courses in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, the student should inform the instructor of the situation as far in advance as possible. When advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email.

Missed or Late Work
All assignments must be completed by the due date by 11:59 PM ET. Assignments submitted after that are considered late.

Late assignments are only accepted with a reasonable and valid excuse and with prior permission. You must contact your instructor in advance of the due date to get permission to submit a late assignment. Assignments submitted late without prior permission will not be accepted.

Assignments with prior permission for late submission may be accepted up to a maximum of three days late. For each day an assignment is late, it may be subject to a 10% per day deduction (i.e. for

assignments submitted one day late, grading starts at 90%; for assignments submitted two days late, grading starts at 80%; for assignments submitted three days late, grading starts at 70%). Assignments submitted more than three days late will not be accepted. Discussion board posts are only accepted during the week in which they are due.

Incompletes

A grade of incomplete (I) will be given only in unusual circumstances. To receive an "I" grade, a written request must be submitted prior to week 6, and approved by the instructor. The request must describe the circumstances, along with a proposed timeline for completing the course work. Submitting a request does not ensure that an incomplete grade will be granted. If granted, you will be required to fill out and sign an "Incomplete Contract" form that will be turned in with the course grades. Any requests made after the course is completed will not be considered for an incomplete grade.

Academic Integrity and Plagiarism

This course adheres to Purdue University's academic integrity policy and the Purdue Honor Pledge. Any violations of academic integrity will result in a penalty commensurate with the activity.

Violations of academic integrity includes but is not limited to: fabrication (i.e., presenting false information or "made up" information), plagiarism (i.e., copying or paraphrasing others' words or ideas and treating them as your own), contract cheating (i.e., hiring a third-party individual or service to complete course assignments) and complicity (i.e., helping another student to commit acts of academic dishonesty). Please refer to https://www.purdue.edu/odos/osrr/academic-integrity/index.html for further discussion of university policies regarding this issue. Course assignments may be submitted to a plagiarism detection software.

Purdue Honor Pledge: *"As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – We are Purdue."* https://www.purdue.edu/odos/osrr/honor-pledge/about.html

Use of Copyrighted Materials

Online educational environments, like all learning environments, should provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students enrolled in and instructors working in online courses are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes, available here. Students may not copy, reproduce or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

Accessibility

Purdue University responds to the needs of the students with disabilities through the provision of auxiliary aids and services that allow a student with disability to fully access and participate in the programs, services and activities at Purdue University. It is the student's responsibility to notify the Disability Resource Center (drc@purdue.edu or 765-494-1247) of a condition which may require accommodation. It is also the student's responsibility to inform, in the first week of class, the instructor about the disability and discuss any accommodations.

Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal

of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran (http://www.purdue.edu/purdue/ea_eou_statement.html). Any student who believes they have been discriminated against may submit a complaint to the Office of Institutional Equity (http://www.purdue.edu/report-hate). Information may be reported anonymously.

Anti-Harassment

Harassment in the workplace or the educational environment is unacceptable conduct and will not be tolerated. Purdue University is committed to maintaining an educational and work climate for faculty, staff and students that is positive and free from all forms of Harassment. This policy addresses Harassment in all forms, including Harassment toward individuals for reasons of race, religion, color, sex, age, national origin or ancestry, genetic information, disability, status as a veteran, marital status, parental status, sexual orientation, gender identity or gender expression. All members of the University community must be able to pursue their goals, educational needs and working lives without intimidation or injury generated by intolerance and Harassment. http://www.purdue.edu/policies/ethics/iiic1.html#statement

Emergencies

In the event of a major emergency, course requirements, deadlines and grading percentages are subject to changes. Relevant changes to this course will be announced on the course website and by email.

You are expected to read your @purdue.edu email on a frequent basis.