

# PUBH A214: PUBLIC HEALTH STATISTICS

Item	Value
Curriculum Committee Approval Date	11/15/2023
Top Code	170100 - Mathematics, General
Units	4 Total Units
Hours	72 Total Hours (Lecture Hours 72)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• OC Comm/Analytical Thinking - AA (OA2)
Associate Science Local General Education (GE)	• OCC Comm/AnalyticalThinking- AS (OAS2)

## Course Description

This course emphasizes the calculation, interpretation, and application of descriptive and inferential statistics in public health and related fields. Topics include statistical principles and the use of probability techniques, hypothesis testing, and predictive techniques to facilitate evidence-based practices. Topics include descriptive statistics; probability and sampling distributions, statistical inference; correlation and linear regression; analysis of variance, chi-square, and t-tests. Application of statistical concepts will incorporate data from public health sources, including research and governmental datasets. The application of technology for statistical analysis, including the interpretation of the relevance of the statistical findings, will be covered. ADVISORY: English, one level below transfer (ie, eligibility for English composition (CID ENGL 100) and reading a course with an existing skill of ability to read a college level text. Transfer Credit: CSU; UC. C-ID: PH 114. C-ID: PH 114.

## Course Level Student Learning Outcome(s)

1. Illustrate statistical concepts related to public health using graphical, numerical, and written explanations.
2. Describe different types of research study designs and the pros and cons of each.
3. Apply valid and appropriate statistical methods to problems and applications in public health and related fields.

## Course Objectives

- 1. Interpret data displayed in tables and graphically.
- 2. Describe the usefulness of descriptive and inferential statistics, demonstrating an understanding of the association versus causality.
- 3. Apply concepts of sample space and probability.
- 4. Calculate measures of central tendency and variation for a given data set.
- 5. Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
- 6. Calculate the mean and variance of a discrete distribution.

- 7. Describe different types of research study designs and the pros and cons of each.
- 8. Calculate probabilities using normal and t-distributions.
- 9. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
- 10. Construct and interpret confidence intervals.
- 11. Determine and interpret levels of statistical significance including p-values.
- 12. Interpret the output of a technology-based statistical analysis.
- 13. Identify the basic concept of hypothesis testing including Type I and II errors.
- 14. Formulate hypothesis tests involving samples from one and two populations.
- 15. Select the appropriate technique for testing a hypothesis and interpret the result.
- 16. Use regression lines and ANOVA for estimation and inference, and interpret the associated statistics.
- 17. Apply the appropriate regression method to data to predict the occurrence of an event and account for potential confounding variables.
- 18. Use appropriate statistical techniques to analyze and interpret applications based on data from public health, health science, social science, psychology, life science, health science, or population demographic information.

## Lecture Content

Introduction to statistics use health public health and biostatistics Descriptive versus inferential statistics Data, Measurement, and Variables Dichotomous variables Categorical variables Ordinal variables Continuous variables Descriptive statistics: Measurement Measures of central tendency Measurement of variation Variance and Standard Deviation Degrees of Freedom Range and Interquartile range Coefficient of variation Association and causality Correlation Criteria for causality Risks, rates, and ratios, and their use in Public Health Summarizing data graphically and numerically Distributions Comparing groups Trends over time Misleading graphs Sample spaces and probability Random variables and expected value Types of studies Sampling and sampling distributions Discrete distributions – Binomial Continuous distributions – Normal The Central Limit Theorem Estimation and confidence intervals Hypothesis Testing and inference Null hypothesis Types of errors in statistical tests Hypothesis tests for population mean or population proportion Hypothesis tests for comparing two independent groups Hypothesis tests for comparing two paired groups Hypothesis tests for comparing means in more than two groups Bias and confounding variables t-tests for one and two populations Chi-square test Analysis of variance (ANOVA) Regressions Simple linear regression Linear regression Multivariable linear regression Logistic regression Applications of descriptive and inferential statistics using data from public health, health science, social science, psychology, life science, health science, or population demographic information. The use of technology for statistical analysis.

## Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

## Instructional Techniques

Lecture, discussion, in-class activities and online computer tutorials

## Reading Assignments

Textbook chapters and supplements. (1 hour per week)

## Writing Assignments

Written assignments, including interpreting statistical results, explaining concepts discussed in class, or other reports. (2 hours per week)

## Out-of-class Assignments

Practice problem sets requiring the application of statistical concepts covered in class. Assignments requiring the organization, analysis, and interpretation of raw public health data using proper statistical techniques. Preparation of assignments that require students to answer the instructor-provided prompt that will inform in-class group discussions. (3 hours per week)

## Demonstration of Critical Thinking

Students will evaluate the results of statistical methods to discern possible meaning and application. They will formulate a hypothesis and consider possible bias and Type I/Type II errors.

## Required Writing, Problem Solving, Skills Demonstration

Written assignments will require students to demonstrate their skills in identifying the statistical method appropriate for a data set and research question.

## Eligible Disciplines

Health: Masters degree in health science, health education, biology, nursing, physical education, kinesiology, exercise science, dietetics, or nutrition OR bachelors degree in any of the above AND masters degree in public health, or any biological science OR the equivalent. Masters degree required. Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

## Textbooks Resources

1. Required Sullivan, L. M.. Biostatistics for Population Health: A Primer. , ed. Jones Bartlett Learning, 2020 2. Required Merrill, R. M. Principles and Applications of Biostatistics, ed. Jones Bartlett Learning, 2022

## Other Resources

1. OER Illowski, B. Dean, S. Introductory Statistics. Openstax. Available at <https://openstax.org/details/books/introductory-statistics>