East Tennessee State University
Department Of Biostatistics and Epidemiology
BSTA 3000:
Introduction to Biostatistics

Class Location: Online, or "WHO KNOWS!"
Instructor: Mike McKamey, MPH, MEd, Senior Lecturer, etc..
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Please use your student's ETSU account when e-mailing the instructor.
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Office Hours: N/A

COURSE DESCRIPTION

Statistical logic and elementary techniques of statistical analysis as applied to health. Collection and interpretation of population, natality, morbidity and mortality statistics. Elementary epidemiology, probability, sampling and tests of significance will be reviewed.

COURSE TEXTBOOK

Recommended (but not required) textbook: Kuzma JW, Bohnenblust SE. *Basic Statistics for the Health Sciences*, 5th Edition. 2005. McGraw Hill. ISBN: 0-707-284403-5 Previous additions are FINE! Save money!

In this course, depending on your schedule outside of the class or geographic location, you may be required to arrange exam testing through ProctorU, an online proctoring service. This option will have a fee associated that will be the responsibility of the student to pay.

COURSE PURPOSE AND GOALS

The primary aim of the course is to provide a working knowledge of the fundamentals of biostatistics as well as to serve as a foundation for more advanced study of biostatistical and epidemiological methods. At the completion of this course, the student should understand and be able to apply the biostatistical methodological topics for descriptive and analytical biostatistics that are described in the professional competencies and learning outcomes below.

PROFESSIONALISM, COMMUNICATION, AND TECHNOLOGY

COMPETENCIES AND LEARNING OBJECTIVES

	Professionalism	Communication	Technology
Biostatics	**Working groups –** Students establish and participate in both study groups and presentation groups regularly throughout the semester by curricular design	**Teachbacks –** Students lead classroom review sessions in advance of exams	**Descriptive** – Students summarize data with charts using Excel software **Analytical** – Excel and online software applied for quantitative and qualitative tests of significance

This course addresses the following **BSHS Microbiology Concentration, BSHS Human Health Concentration and BSPH Core Concentration** competencies. The competencies are lettered, and the associated course-specific learning objectives are numbered.

A. Describe the role biostatistics serves in the discipline of public health.
   1. Establish proficiency in application of logistical computations to address public health questions.
   2. Embrace the need for statistical significance and confidence for valid conclusions.
   3. Demonstrate proper displaying of summary findings.
   4. Utilize basic terminology associated with biostatistics.
   5. Contrast survey techniques with experimental techniques.

B. Recognize basic concepts of probability, random variation and commonly used statistical probability distributions.
   1. Recognize measures of location and variation.
   2. Differentiate between "and" and "or" statements of event outcomes
   3. Realize the interaction inherent in conditional probabilities.
   4. Differentiate between complimentary and mutually-exclusive events.
   5. Appreciate the difference between permutations and combinations.
   6. Apply the binomial distribution properly.
   7. Relate areas under the normal curve to probability.
   8. Apply the Central Limit Theorem.

C. Read with comprehension results of statistical analyses found in public health studies and reports.
   1. Apply the premises of hypothesis testing.
   2. Utilize the application of significance testing.
   3. Utilize the application of confidence levels (α) and intervals.
   4. Recognize the meaning of p-values.

D. Use information technology to access and interpret public health data.
   1. Apply Excel software to data sets to draw inferences about potential interventions.
   2. Apply Excel software to data sets for descriptive and analytical conclusions.
   3. Examine available sources of data used in descriptive and analytical biostatistics and epidemiology.

E. Recognize the role of evidence-based principles and scientific knowledge in critical evaluation and decision-making in public health.
   1. Recognize the importance of proper sampling.
   2. Recognize the importance of proper scientific methodology, including significance testing.
   3. Apply concepts of specificity, sensitivity, and false results in screening tests

F. Read with comprehension public health evaluation reports with a focus on their quality, utility, and impact on public health.
   1. Differentiate the applicability of odds ratio and relative risk in intervention planning.
   2. Recognize the difference between mathematical significance and practical impact.
   3. Compare and contrast the application and feasibility of case-control and cohort studies.

B.S. Environmental Health Competencies
In addition, BSEH students will:

- Be able to apply basic statistical methods to address the role of environmental exposures on public health.
- Be able to apply basic statistical methods to address environmental health research questions.

The course outline is provided on the following pages, and includes key topics, assessment types and times, as well as correlative professional competencies and learning outcomes for each topic.

Topic	Chapters/Topics Professional Competencies and Learning Objectives	Learning Activities, Resources, and **Assessment**	Key Topics
1	**Chapter 1: *Statistics and How they Are Used*** **Competencies and Objectives: A1, A4, A5, D3, F3**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Basic terminology • Surveys vs experiments • Sources of data • Comparison of ratios in a 2 x 2 table
2	**Chapter 2: *Population and Samples*** **Competencies and Objectives covered: A4, E1, E2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Selecting appropriate samples • Sampling procedures: convenience, simple, systematic, stratified, cluster • Randomization of sampling
3	**Chapter 3: *Organizing and Displaying Data*** **Competencies and Objectives covered: A3, A4, D2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework** • **Excel Project 1**	• Qualitative vs quantitative • Interval and ratio scales • Nominal and ordinal • Frequency polygons • Histograms • Bar charts • Pie charts
4	**Chapter 4: *Summarizing Data*** **Competencies and Objectives covered: A3, A4, B1, D2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework** • **Excel Project 1**	• Measures of central tendency (mean, median, mode) • Measures of variation (variance and standard deviation) • Skewness
5	**Examination I:** Covers Chapters 1 through 4 **Competencies and Objectives covered:** Cumulative WE WILL DECIDE A CLASS OR 2 IN ADVANCE WHEN THIS WILL BE	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• All topics covered in Chapters 1 through 4
6	**Chapter 5A: *Basic Probability*** **Competencies and Objectives covered: A1, A4, B2, B3, B4**	• D2L supplemental Resources • Summary Notes • **Written Examination**	• Complementary events • Mutually-exclusive events • Complementary events • Multiplication rule • Addition rule • Conditional probability

7	**Chapter 5B: *Permutations, Combinations, and Binomial Distributions*** **Competencies and Objectives covered: A4, B5, B6**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Permutations • Combinations • Binomial distributions
8	**Chapter 6: *Normal Distribution*** **Competencies and Objectives covered: A1, A3, A4, B1, B7, E2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Properties of normal curve • Area as related to probability • Z-score • Computation of areas under the normal curve
9	**Chapter 7: *Sampling Distribution of Means*** **Competencies and Objectives covered: A1, A3, A4, B1, B7, B8, E2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Central Limit Theorem • Standard error • Point estimates • Computation of proportions of sample means
10	**Chapter 8: *One-sample Significance Testing and Confidence Intervals*** **Competencies and Objectives covered: A1, A2, A3, A4, C1, C2, C3, E2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Hypothesis testing • One-sample t-test • One vs two tailed • Confidence levels • Confidence intervals • Effect of sample size
11	**Examination II:** Covers Chapters 5 through 8 **Competencies and Objectives covered:** Cumulative WE WILL DECIDE A CLASS OR 2 IN ADVANCE WHEN THIS WILL BE	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Examination**	• All topics covered in Chapters 5 through 8
12	**Chapter 9: *Two-sample Significance Testing and Confidence Intervals*** **Competencies and Objectives covered: A1, A2, A3, A4, C1, C2, C3, C4, D1, D2, E2, E3**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Excel Project II**	• Independent vs paired • Two-sample test for significance • Sensitivity • Specificity • False positive and negative
13	**Chapter 10: *ANOVA*** **Competencies and Objectives covered: A1, A2, A4, C1, C2, C4, D1, D2, E2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Excel Project II**	• Between-group vs within-group variance • Assumptions about ANOVA • Application of ANOVA

14	**Chapter 12: Chi-square Test** **Competencies and Objectives covered: A1, A2, A3, A4, C1, C2, E2, F1, F2, F3**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Homework**	• Comparison of qualitative proportions • 2x2 contingency tables • Test of significance between proportions • Strength of association
15	**Chapter 13: Correlation and Linear Regression** **Competencies and Objectives covered: A1, A2, A3, A4, C1, C2, D1, D2, D3, E2, F2**	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Excel Project III** •	• Scatter diagrams • Best-fit trendline • Correlation as related to trendline • Coefficient of determination • Regression analysis • Applications of equation for straight line
16	**Examination III:** Covers Chapters 9, 10, 12, 13 **Competencies and Objectives covered:** Cumulative	• Lecture and discussion • Read assigned materials • D2L supplemental Resources • Summary Notes • **Written Examination**	• All topics covered in Chapters 9, 10, 12, 13

OTHER COURSE MATERIALS

Summary Notes: Chapters will be summarized, with key points emphasized, by a collection of chapter notes. Although these are not collected or grades, they are constructed by the same person (me) that makes the exam questions (again, me), so their value should be evident. Additional resource summary materials and illustrative examples are available on D2L to compliment the text coverage.

MAJOR ASSIGNMENTS, LEARNING ACTIVITIES, and RELATED MATERIALS

Homework Quizzes: Each chapter has a "Homework Quiz" online to re-enforce learning. Don't miss the window for taking a quiz, since it will not be re-opened. Two attempts allowed, answers provided after first, recorded grade is the average of both submissions. If the first submission grade is deemed adequate, no penalty for not submitting a second time.

Computer Projects: Excel software shall be used to determine both descriptive and analytical results for data sets provided. Late submissions will have a **deduction of 30%.**

Exams: Four exams will be scheduled through the semester. These exams will have a **deduction of 30%** for any late exams.

GRADING AND GRADING SCALE

Grading: Grades are based on the following:

Examination 1*	20%
Examination 2*	20%
Examination 3*	20%
Homework Quizzes	20%
Computer Projects	20%

All items noted by "*" are proctored, in-class assessments demonstrating individual ability. Makeup opportunities will not be provided without truly compelling and documented extenuating circumstances as described in the syllabus policy and the program guidelines.

A final letter grade is assigned according to the Department of Public Health guidelines:

A	95-100%	B-	83-85%	D+	71-73%
A-	92-94%	C+	80-82%	D	68-70%
B+	89-91%	C	77-79%	F	0-67%
B	86-88%	C-	74-76%		

Learning the material: It is important to keep up with assignments, reading, studying the topic material, and completing the exercises. If the student has trouble understanding something, contact the instructor by phone or email to get help. It is not acceptable to wait until the last day to seek help. The instructor may not be available.

Public Health students will be allowed to progress in the Public Health major as long as all Public Health core and concentration courses are completed with a grade of C or better.

Progression status will be evaluated at the close of each semester. COBH students receiving a grade below a C in any core or concentration course will be placed on probationary status in the College of Public Health. If those COBH students wish to repeat the course and progress in the program, they must file an appeal with the Public Health Undergraduate Coordinator.

A COBH student with probationary status who receives a second grade below a C in any core or concentration course will not be permitted to progress in the Public Health major.

ATTENDANCE POLICY / MISSED CLASS ASSIGNMENTS

It is expected that a student will attend classes regularly. Regardless of reason, the student is expected to take responsibility for learning information presented or referenced on the day(s) of absence.

If a student misses a quiz/examination or encounter due to an EXCUSED absence (defined below) and informs the instructor prior to the absence the quiz/examination or encounter may be completed at the discretion of the faculty. If, however, a quiz/examination or encounter is missed due to an UNEXCUSED absence, a grade of zero will be recorded for classes with missed quizzes/examinations or encounters.

Excused absences

- In the case of emergency (e.g. death in the family or illness), absence from the class may be excused. In such cases it is the responsibility of the student to explain the situation to the faculty member as soon as possible. The faculty member may request verification of the emergency situation or illness from the student.
- Students confined at home or in a hospital for an extended period of time shall notify the faculty member from whose class they will be absent so that arrangements can be made for completion of assignments, if feasible.
- Documented participation in university sanctioned events

COVID note – As of Fall 2020 previous leniencies may not be in effect. COVID circumstances need to be pervasive as detailed and documented to the instructor and administration.

During inclement weather the university does not follow guidelines comparable to public school closures. The official university policy is delineated below.

The new syllabus policy is for students to access information on help services, disability allowances, diversity, mask usage, academic integrity, rights and freedoms, permits/overrides, attendance, Title IX, technical resources, important dates, prerequisites, discrimination/harassment, and academic integrity though the link provided below.

https://www.etsu.edu/curriculum-innovation/syllabusattachment.php

Current mask usage policy as of August, 2021

Please wear a mask or other appropriate Face Covering to class. Wearing a mask that covers your nose and mouth communicates the care and respect you have for yourself, the care and respect you have for those you live with, and the care and respect you have for other members of this classroom community. The best evidence we have, from public health professionals, is that wearing masks is one of the best ways to protect against the spread of COVID-19 and other airborne illnesses. Students with medical conditions that inhibit their ability to wear masks should register through disability services by contact Disability Services by telephone at 423-439-8346 or by email at littleme@etsu.edu to request an accommodation. The policy can be found at https://www.etsu.edu/policies/health-safety/face-coverings.php.

HAVE A GREAT SEMESTER!