BHCC Statistics Cluster Syllabus

Fall 2019

Course

- MAT-098-01CZ and MAT-181-11CZ
- Monday, Tuesday, Wednesday, and Thursday at 8:30 AM
- https://bhcc.digication.com/stat3

Professor

- Chad Worley
- ceworley@bhcc.mass.edu

Textbook

- OpenIntro Statistics 4th Edition
- http://www.openintro.org/os
- Easiest to download pdf at class website: https://bhcc.digication.com/stat3/home

Calculator

- You need a scientific calculator.
- Recommended: Texas Instruments TI-30XS Multiview or Texas Instruments TI-36X Pro
- If you have a smart phone, you can use Geogebra Scientific Calculator.
- If you do not have a smart phone and cannot afford a calculator, please send me an email and I will lend you a calculator.

Exams and Final

Your lowest exam score is dropped. If you miss an exam, that score will be dropped.

- Exam 1 - Thursday September 26
- Exam 2 - Thursday October 17
- Exam 3 - Thursday November 7
- Exam 4 - Wednesday November 27
- Final - **Tuesday December 17** and **Wednesday December 18**

Learning outcomes

1. Summarize data numerically and graphically including bar charts, dot plots, histograms and box plots.
2. Compare and analyze distributions both graphically and numerically.
3. Apply the concepts of mean, median and variability of quantitative data.
4. Analyze bivariate data and understand concepts of correlation and simple linear regression.
5. Evaluate linear equations, understand concepts of slope, intercepts, and inequalities.
6. Apply basic probability rules and be able to construct/analyze two-way tables.
7. Distinguish between discrete and continuous variables and their probability distributions.
8. Apply the concept of the normal distribution and applicable techniques at a basic level.

9. Recognize the importance of variation and uncertainty in the world and understand how statistics can improve decisions when faced with uncertainty.
10. Acquire knowledge of and proficiency with a broad range of statistical concepts, tools and relevant computer software useful for statistical applications.
11. Acquire critical thinking skills that enable application of statistics in new and unfamiliar settings.
12. Become responsible and competent statistical professional at various levels of employment and successfully pursue any further goals in graduate and post-graduate educational levels.

Teaching procedures

- We will have lectures, worksheets, homeworks and exams.
- You will engage in a variety of learning methodologies in working toward these objectives. You will be engaged in problem solving, collaborative learning, writing reflections, working individually and in groups during classroom meetings and outside of class.

Course Description

- Mat-098 is designed as a substitute for Foundations of Algebra (MAT097) for non-STEM students who will be taking Statistics I (MAT181) for their program requirements. Topics include being able to summarize and analyze data distributions both numerically and graphically. Evaluating linear equations while understanding the concepts of slope, intercepts, inequalities, correlation and regression will be discussed. The concept of probability and probability distributions will be introduced for both discrete and continuous variables. This course does not satisfy degree requirements. Prerequisite: Grade of C or better in Foundations of Mathematics (MAT093) or placement.
- Mat-181 covers statistical concepts and methods. Topics include data organization, averages and variation; elementary probability; binomial, normal, and t-distributions; estimation and hypothesis testing; and linear correlation and regression. The course meets the General Education requirement for Quantitative Problem Solving. Prerequisite: Grade of C or better in Foundations of Algebra (MAT097) or Pre-Statistics (MAT098) or placement.

Grade breakdown

- (10%) Homework
- (10%) Quizzes
- (20%) In-class work, participation
- (30%) Exams
- (10%) Projects
- (20%) Final

Overall score	Mat-098 grade
90-100	A
80-90	A-
75-80	B+
70-75	B
65-70	B-
60-65	C+
50-60	C
0-50	F

Overall score	Mat-181 grade
94-100	A
90-94	A-
87-90	B+
83-87	B
80-83	B-
77-80	C+
70-77	C
0-70	F

Attendance

Students are expected to attend ALL scheduled classes and to arrive ON TIME. Statistics have shown that grades improve with better attendance. The College's policy is that a student is expected to come to all class sessions prepared to participate in an appropriate manner. Absence from class is considered a serious matter and never excuses a student from class work. A student must complete all assignments, exams, and other requirements to receive credit. It is the student's responsibility to notify the instructor on or before the date of the absence.

Assistance and Time on Task

Students will have the assistance of the instructor during class, during office hours, or by appointment. Students are encouraged to use the Math Space (E234-D or E) outside of class to receive help. Your classmates are also valuable resources. You should spend a minimum of 10-12 hours per week (an average of 1+ hours per weekday) on course assignments in order to be successful. Your instructor will closely monitor your progress and will speak with you if you fall behind schedule.

Code of conduct

All students are expected to adhere to the honor code regarding course assignments and exams. This includes completing assignments without unauthorized aid when instructed. Any student suspected of cheating on an assignment or an exam will not pass that assignment or exam.

Student Responsibilities

- To be knowledgeable of and to comply with laws, all civic and College regulations and the directives, policies and procedures of the federal government, Commonwealth, the Massachusetts Board of Higher Education, Bunker Hill Community College and the Student Government Association.

- To behave in a manner that is respectful of all individuals including faculty members, College staff, administrators and students.

- To behave in a manner that is respectful of the property of individuals, groups and the College.

- To maintain a high standard of honesty.

- To behave in a manner that does not interfere with the educational goals of the College and with the individual rights of the members of the College community.

- To behave in a manner that does not disrupt or interfere with the learning environment of others inside and outside of the classroom including at College events.

IN PROGRESS (IP) GRADE

If a student does not finish all coursework within the 15-week semester, he/she may receive an "In Progress" grade only if the following conditions are met:

1. The student has no more than two (2) unexcused absences.
2. The student is making steady progress with the course material AND has passed three exams
3. During the last week of class, you must sign an IP contract form stating the conditions for completion of the remaining course requirements.

INDIVIDUALS WITH A DISABILITY

Bunker Hill Community College is committed to providing equal access to the educational experience for all students in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990.

- **College Accommodations and Support Services**: The Office of Disability Support Services is a student-focused department dedicated to assisting members of the BHCC community with documented physical and/or learning disabilities. Students may be eligible for services that include tutoring, testing and other classroom accommodations. To get more information or request an accommodation, contact the Disability Support Services Office at 617-228-2327 (Room E222). Students are encouraged to request accommodations as early as possible and ideally before the start of the semester. For information about programs and services please visit: http://www.bhcc.mass.edu/disabilitysupportservices/.

Instructional Objectives

Unit 1

- Identify types of data
- Identify the measurement level of a variable
- Identify basic sampling techniques
- Organize data using frequency distributions
- Represent frequency distributions graphically
- Represent data using bar graphs
- Summarize data using mean, median, and mode
- Describe data using range, variance, and standard deviation
- Identify the position of a data point by using percentiles and standard scores
- Produce stem and leaf displays and box and whisker plots

Unit 2

- Determine the number of possible outcomes using a tree diagram
- Find the total number of possible outcomes using the multiplication rule
- Calculate the number of permutations of n things taken r at a time
- Calculate the number of combinations of n things taken r at a time
- Determine sample spaces
- Find the probability of an event using relative frequencies
- Find the probability of a compound event
- Find the conditional probability of an event
- Construct a probability distribution for a discrete random variable
- Find the expected value and standard deviation for a discrete random variable
- Calculate binomial probabilities
- Find the mean and standard deviation for a binomial distribution

Unit 3

- Identify the properties of a normal distribution
- Find the area under the standard normal distribution for various intervals
- Transform a normally distributed random variable into a standard normal variable
- Find specific data values for given areas under a normal distribution
- State the Central Limit Theorem
- Use the Central Limit Theorem to solve problems involving the distribution of the sample mean for large samples
- Use the normal distribution to approximate probabilities for a binomial

Unit 4

- Distinguish between point estimates and interval estimates
- Find the confidence interval for μ with σ known
- Find the confidence interval for μ with σ unknown
- Structure a classical test of hypothesis
- Test means for one-sample (using large and small samples)
- Test for a proportion
- Test the difference between means for dependent samples

Unit 5

- Find the equation of the least squares regression line
- Compute the standard error of the estimate
- Find the confidence interval for the dependent variable
- Compute the linear correlation coefficient
- Test for a significant linear correlation
- Compute the coefficient of determination