

1 Warning

Community College of Philadelphia is a firm adherent to the principle of academic freedom. In light of this, faculty are not required to follow a particular approach or a particular textbook for the courses they teach. Most faculty, however, have more or less uniform guidelines for specific courses, and indeed, many use a particular textbook or approach in order to conform to area institutions. Therefore, the sample syllabus found here is not binding to faculty, but represents a synthesis of what most faculty do or aspire to do when they teach a particular course. What follows should not be interpreted as a prescription, but rather, as a means to help the placement of our students in transfer institutions.

2 Catalogue Description

Introductory course in biostatistics intended for students interested in pursuing careers in medically related fields, in the life sciences or chemistry. Students in physics and electronics also will benefit. The course is application driven and will utilize computer software on a microcomputer, as well as calculators. Statistical topics include descriptive measures, graphical methods, discrete and continuous probability distributions, estimation, hypothesis testing for one and two samples and categorical data. Good algebra skills are strongly recommended. Prerequisite: MATH 118 with a grade of C or better or MATH 161 or higher placement.

3 Allotted Time

Math 251 is a four credit course. Thus it meets for $4 \times 14 = 56$ hours in a semester, including two hours for a final examination. Instructors usually give three or four exams (generally lasting at least 55 minutes), and a 2-hour long final exam.

4 Topics Outline

This outline follows *Elementary Statistics* 9th edition, by Mario F. Triola.

- Distinguish between a population and a sample.
- Distinguish between different types (discrete and continuous) of variables.
- Choose and draw appropriate graphs for data sets.
- Frequency distributions.
- Calculate and interpret appropriate numerical summaries of center and variation for one-variable data sets.
- Calculate probabilities using basic rules of probability.
- Construct the probability distribution for a discrete random variable.
- Identify the shape of a distribution.
- Identify the attributes of the normal probability distribution.
- Identify the attributes of the binomial probability distribution.
- Mean, variance, and standard deviation for the binomial distribution.
- Use standardization to find proportions/percents/probabilities associated with a normal distribution.
- Describe the sampling distribution of the sample mean (including center, spread and shape).
- Calculate probabilities associated with the sampling distribution of the sample mean.
- Construct and interpret a confidence interval to estimate a population mean/variance/standard deviation.

- State the null and alternative hypotheses for a hypothesis test.
- Calculate the value of a test statistic.
- Calculate a p-value.
- Testing a claim about a proportion/mean/standard deviation,
- Make a decision and conclusion for a hypothesis test (traditional method and p-value method).
- Inferences from two samples.
- Determine whether or not linear regression is appropriate for a data set.
- Calculate and interpret the correlation coefficient.
- Write the equation of a regression line.

5 Competencies

1. The Student will demonstrate knowledge of describing, exploring, and comparing data using:
 - (a) frequency distributions,
 - (b) visualizing data,
 - (c) measures of center,
 - (d) measures of variation,
 - (e) measures of relative standing.

2. The Student will demonstrate knowledge of probability distributions by computing:
 - (a) binomial probability distributions,
 - (b) mean, variance, and standard deviation for the binomial distribution,
 - (c) the standard normal distribution,
 - (d) applications of normal distributions,
 - (e) normal as approximating to binomial.
3. The Student will demonstrate knowledge of estimates and sample sizes by:
 - (a) estimating a population proportion,
 - (b) estimating a population mean,
 - (c) estimating a population variance.
4. The Student will demonstrate knowledge of hypothesis testing by using:
 - (a) basic test of hypotheses,
 - (b) testing a claim about a proportion,
 - (c) testing a claim about a mean,
 - (d) testing a claim about a standard deviation or variance,
 - (e) inferences about two proportions,
 - (f) inference about two means,
 - (g) inferences from matched pairs,
 - (h) comparing variation in two samples.
5. The Student will demonstrate knowledge of correlation and regression.

6 Core Problems

The core problems below follow *Elementary Statistics* 9th edition by Mario F. Triola.

Topics	Exercises from Triola
2.2 Frequency Distributions	1, 3, 5, 7, 9, 11
2.3 Visualizing Data	1, 2, 3, 4, 5, 7, 15, 20
2.4 Measures of center	4, 7, 11, 17, 23
2.5 Measures of Variation	5, 7, 11, 41 (a)-(d)
2.6 Measures of Relative Standing	1, 9, 10, 29-36

3.2 Fundamentals	3, 4, 5, 11, 29
3.3 Addition Rule	1, 3, 9-12, 25
3.4 Multiplication Rule:Basics	1, 3, 7, 9, 26, 27
4.2 Random Variables	1, 2, 3, 5, 7, 13, 24
4.3 Binomial Probability Distributions	1-8, 9, 10, 17, 19, 21, 22
4.4 Mean, Variance, and SD for the Binomial Distribution	1, 3, 5, 6, 8
5.2 The Standard Normal Distribution	1, 3, 5, 7, 9-27 odd, 33, 35, 43
5.3 Applications of Normal Distributions	1, 3, 5, 7, 11, 13, 22
5.6 Normal as Approximation to Binomial	1, 3, 5, 7, 9, 11,13,15,17, 31
6.2 Estimating a Population Proportion	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 27, 49
6.3 Estimating a Population Mean (SD known)	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 25
6.4 Estimating a Population Mean (SD not known)	1, 3, 5, 7, 9, 11, 13, 15, 19
6.5 Estimating a Population Variance	1,3, 5, 7, 9, 11, 13, 17
7.2 Basic of Hypothesis Testing	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31
7.3 Testing a Claim About a Proportion	1, 3, 5, 11, 21
7.4 Testing a Claim About a Mean (SD known)	1, 3, 5, 7, 9, 11
7.5 Testing a Claim About a Mean (SD not known)	1, 3, 5, 7, 9, 11, 13, 15
8.2 Inferences About Two Proportions	1, 3, 5, 7, 9, 11
8.3 Inferences About Two Means	1, 3, 5, 7, 9, 11, 13
8.4 Inferences from Matched Pairs	1, 3, 5, 7, 9,11
9.2 Correlation	1, 3, 5, 9, 11
9.3 Regression	1, 3, 5, 7, 9, 11