# Common Course Outline

## Math 153

## Introduction to Statistical Methods

### 4 Semester Hours

# The Community College of Baltimore County

**Description**

Students will develop an understanding of statistical methodology and use of critical judgment in analyzing data sets. Topics include descriptive statistics, introduction to probability, normal and binomial distributions, hypothesis testing, confidence intervals, regression and correlation, chi-square distribution, and introduction to ANOVA. Computer applications are considered. See instructor for the calculator required**.** A statistical computer package, e.g. Minitab, is introduced as a computational tool. Prerequisites: Reading Skill 2, English Skill 1, Algebra I and II and a satisfactory score on the MATH placement test or satisfactory completion of MATH101.

**Overall Course Objectives**

Upon successful completion of this course students will be able to:

1. Demonstrate the relationship of statistics to the modern world. (I,IV,V,1,2,3,6,7)
2. Apply technology to statistical problems.(IV,4)
3. Assess statistical reasoning in everyday life.(I,1,3,6,7)
4. Describe data with appropriate measures of central tendency and variability.(I, IV,V,1,3,4,6,7)
5. Evaluate statistical graphs.(I,IV,V,1,3,4,6,7)
6. Analyze linear regression and correlation problems (I,IV,V,1,3,4,5,6,7)
7. Examine statistical concepts as they apply to diverse populations. (III, V)
8. Compute binomial probabilities (I,IV,1,4,6,7)
9. Compute normal distribution probabilities (I,IV,1,4,6,7)
10. Apply the fundamentals of probability and the addition and multiplication rules to introductory problems.(I,IV,1,3,4,6,7)
11. Evaluate confidence intervals in order to make informed decisions about data.(I,IV,V,1,3,4,5,6,7)
12. Determine the validity of conclusions about a population by performing hypothesis tests.(I,IV,V,1,3,4,5,6,7)
13. Perform independence and/or goodness-of-fit tests using the chi-square distribution and data obtained in everyday life.(I,IV,V,1,3,4,6,7)
14. Solve "real-world" problems using a one-way ANOVA.(I,IV,V,1,3,4,6,7)
15. Construct a solution to real world problems using problem methods individually and in groups. (II, III, V, VI, 2, 3, 7)

16. Examine the mathematical contributions made by people from diverse cultures throughout history. (V, 5)
17. Articulate a solution to mathematical problems. (II, 2)

**Major Topics**

I. Introduction
   A. Introductory definitions
   B. Use of statistics in everyday life
II. Descriptive Statistics
   A. Graphs
   B. Measures of Central Tendency
   C. Measures of Variability
III. Probability
   A. Fundamentals and basic concepts
   B. Addition rule
   C. Multiplication rule
IV. Binomial Distribution
   A. Use and interpret binomial probabilities
   B. Mean and standard deviation of a binomial random variable
V. Normal Distribution
   A. Characteristics of the normal distribution
   B. Use and interpret normal probabilities
   C. The Central Limit Theorem
VI. Estimates and Confidence Intervals
   A. Introduction to the t-distribution
   B. Confidence Interval for a population mean, large and small sample sizes
   C. Confidence Interval for a population proportion
VII. Hypothesis testing
   A. Characteristics of a hypothesis test
   B. Hypothesis test of a population mean, large and small sample sizes
   C. Hypothesis test of a population proportion
   D. Hypothesis testing for two populations
VIII. Regression and correlation
   A. Scatter plot
   B. Use and interpret the correlation coefficient
   C. Use and interpret the linear regression line
IX. Chi-Square Distribution
   Independence tests and/or goodness-of-fit test
X. Analysis of Variance (ANOVA)
   One-way ANOVA

**Course Requirements (General Education Goal #VII)**

Students will be given opportunity to collaborate via group work and/or oral presentation of problem solutions. There will be multiple opportunities for the instructor to assess student progress in the course through classwork and/or homework.

Grading: Grading procedures will be determined by the individual faculty member but will include the following:

Tests, Exams, and/or Quizzes: At least two tests will be required. Individual faculty will notify students of the testing procedures to be used.

Other components, such as Projects or Group Work, may be part of the grade.

Final Grades: Grades will be determined by individual faculty members.

The Community College of Baltimore County is committed to providing a high-quality learning experience that results in growth in knowledge, attitudes, and skills necessary to function successfully as a transfer student, in a career and as a citizen. To accomplish this goal, we maintain high academic standards and expect students to accept responsibility for their individual growth by attending classes, completing all homework and other assignments, participating in class activities and preparing for tests.

We take seriously our responsibility to maintain high-quality programs and will periodically ask you to participate in assessment activities to determine whether our students are attaining the knowledge, attitudes and skills appropriate to various courses and programs. The assessment activities may take many different forms such as surveys, standardized or faculty-developed tests, discussion groups or portfolio evaluations. We ask that you take these activities seriously so that we can obtain valid data to use for the continuous improvements of CCBC's course and programs.

**Other Course Information**

Optional Topic: Discrete distributions other than the binomial
Optional Topic: Estimating sample sizes

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