Common Course Outline
MATH 153
Introduction to Statistical Methods
4 Credits

Community College of Baltimore County

Description

MATH 153 – Introduction to Statistical Methods examines 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, and chi-square distribution. A statistical computer package such as StatCrunch, Minitab, etc. is introduced as a computational tool and integrated throughout the course.

4 Credits

Prerequisites: MATH 082 or sufficient math placement score; and ACLT 052 or ACLT 053 or (ESOL 052 and ESOL 054)

Overall Course Objectives

Upon completion of this course students will be able to:
1. demonstrate statistical reasoning in everyday life using real world data;
2. select appropriate technology to manage data, explore data, perform inference, and check conditions;
3. describe data with appropriate measures of central tendency and variability;
4. generate and interpret statistical graphs;
5. analyze bivariate data using linear regression;
6. summarize data in a contingency table;
7. identify association among qualitative variables using conditional distribution;
8. compare and contrast research of data from diverse cultural and global populations;
9. construct and interpret probability models for discrete random variables;
10. solve a normal probability distribution application;
11. apply the fundamentals of probability in application;
12. construct and interpret confidence intervals in order to make inferences about parameters;
13. perform hypothesis testing to draw inferences regarding parameters;
14. perform a test of independence using the chi-square distribution;
15. solve problems involving one-way analysis of variance;
16. construct a solution to real world problems using problem methods individually and in teams;

17. examine the mathematical/statistical contributions made by people from diverse cultures locally, globally, and throughout history;

18. identify and critically evaluate the ethical issues at stake in individual and collective decisions;

19. effectively communicate the results of a statistical analysis; and

20. apply statistical methods to data from diverse cultural and global populations.

Major Topics

I.   Review
   A. Organizing data
   B. Descriptive measures

II.   Sampling Techniques

III.   Managing Grouped Data

IV.   Probability
   A. Fundamentals and basic concepts
   B. Addition rule
   C. Multiplication rule
   D. Conditional probability

V.   Discrete Random Variables A. Probability distributions
   B. Expected value and standard deviation
   C. Use and interpret binomial probabilities
   D. Mean and standard deviation of a binomial random variable

VI.   Normal Distribution
   A. Characteristics of the normal distribution
   B. Use and interpret normal probabilities

VII.   Sampling Distributions A. Central Limit Theorem (CLT)
   B. Mean and standard error
   C. Apply CLT in application

VIII. Estimates and Confidence Intervals A. Introduction to the t-distribution
   B. Confidence interval for a population mean
   C. Confidence interval for a population proportion

IX.   Hypothesis Testing
   A. Purpose of a hypothesis test
   B. Hypothesis test of a population mean
   C. Hypothesis test of a population proportion
   D. Hypothesis testing for two population proportions and means

X.   Regression and Correlation
   A. Scatter plot
   B. Use and interpret the correlation coefficient
   C. Use and interpret the linear regression
   D. Contingency tables and association

XI.   Chi-Square Distribution: Test of Independence

XII.   Comparing Three or More Means: One -Way Analysis Of Variance (ANOVA)

Course Requirements

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

Grading/exams
- A minimum of two tests and the final exam must be proctored and completed without the use of notes or a textbook. The comprehensive final exam should count between 20% and 30% of the overall course grade.
- A minimum of one written project such as a research project, technology project, analysis of a real world problem worth between 10% and 15% of the overall course grade.

Other Course Information
This course is an approved 4-credit General Education course in the Mathematics category. Please refer to the current CCBC Catalog for General Education course criteria and outcomes.

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