Common Course Outline
Math 154
Statistical Methods
4 Semester Hours

The Community College of Baltimore County

Description

Continues the examination of the field of statistical methodology. More in-depth study is made in design of statistical studies and related topics, correlation and regression, chi-square, and analysis of variance. A number of non-parametric methods are considered with contrasts to parametric methods and continued emphasis on method assumptions and determination of the correct method of analysis. A statistical package, e.g. Minitab and/or SAS is an integral factor of the learning process to enhance the development or understanding of probability and sampling distributions (where appropriate), to verify or produce results from data, and to facilitate an emphasis on interpretation.
Prerequisites: Math 153.

Overall Course Objectives

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

1. Apply technology to statistical problems.(IV,4)
2. Examine statistical concepts as they apply to diverse populations. (III, V)
3. Perform appropriate non-parametric statistical tests.(I, IV, V, 1, 3,4, 6, 7)
4. Analyze the inferential aspects of a linear regression problem. (I, IV, V, 1, 3, 4, 6, 7).
5. Analyze the inferential aspects of a linear correlation problem. (I, IV, V, 1, 3, 4, 6, 7).
6. Analyze multiple regression problems. (I, IV, V, 1, 3, 4, 6, 7).
7. Apply the basic concepts of design of experiments to problems in a wide variety of majors.
   (I, V, 1, 3, 6, 7).
8. Apply the basic concepts in conducting a study to problems in a wide variety of majors.
   (I, III, V, VI, 1, 2, 3, 6, 7).
9. Apply the principles of a two-way ANOVA, one number per cell, to a variety of problems.
   (I, IV, V, 1, 3, 4, 6, 7)
10. Apply the principles of a two-way ANOVA, multiple numbers per cell, , to a variety of problems.
    (I, IV, V, 1, 3, 4, 6, 7).
11. Perform hypothesis tests of the population standard deviation using the chi-square distribution.
    (I, IV, V, 1, 3, 4, 6, 7).
12. Construct a solution to real world problems using problem methods individually and in groups. (II, III, V, VI, 2, 3, 7)

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

Major Topics

I. Non-parametric tests
   A. Sign test
   B. Wilcoxan one-sample test
   C. Mann-Whitney two-sample test
   D. Spearman rank correlation coefficient and hypothesis test
   E. Runs test
   F. Discussion of the advantages and disadvantages of non-parametric tests
II. Inferences for Linear Regression and Correlation Coefficient problems
   A. T-tests
   B. ANOVA table
   C. Confidence intervals
   D. Hypothesis test for the correlation coefficient
III. Introduction to multiple regression
IV. Two-way ANOVA
   A. One observation per cell
   B. Several observations per cell: investigation of interaction

V. Principles of conducting a study: Type II error and power
VI. Review of the Chi-square Distribution and additional applications.
VII. F-distribution and applications, such as hypothesis tests concerning two population variances.

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 one test and one statistical research project using advanced techniques discussed in class are required. Individual faculty will notify students of the testing procedures to be used.

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

Additional topics may be selected by the instructor.

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