University of Arkansas – Fort Smith
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General Syllabus

STAT 4203 Nonparametric Statistics

Credit Hours: 3 Lecture Hours: 3 Laboratory Hours: 0

Prerequisite: STAT 3703 Statistical Computation

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

The essential ideas and implementations of both traditional and contemporary nonparametric statistical methods of data analysis are covered. Allows students to investigate nonparametric methods on a more in depth level than in previous courses and apply it to data in their particular disciplines.

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Reinforce and supplement prior knowledge of fundamental statistical topics such as the goals of a statistical analysis; elements and principles of hypothesis testing and confidence intervals; comparative studies.
2. Understand and apply the general concept of nonparametric statistics.
3. Perform a variety of nonparametric statistical analyses such as:
   a. One and two sample tests (e.g. binomial test, Wilcoxon test, etc.)
   b. *K*-sample methods (Kruskal-Wallis test, etc.)
   c. Tests for trends/association.
   d. Modern use of computing in nonparametric statistics.
   e. Classification and regression trees.
4. Use statistical software for data management and performance of basic nonparametric statistical analyses.
5. Explain findings with others using appropriate statistical and non-statistical language.

B. University Learning Outcomes-

Nonparametric Statistics enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will draw conclusions and/or solve problems. Students will access and evaluate appropriate information through written and electronic means. Students will think critically to reach viable solutions to a problem and be able to justify those solutions.

Communication Skills (written and oral)

Students will communicate effectively with a variety of audiences in any setting. Students will compose coherent documents appropriate to the intended audience. Students will effectively communicate orally in a public setting.

Ethical Decision Making

Students will recognize and analyze ethical dilemmas. Students will apply ethical concepts and rules to determine viable alternatives in any given situation.

Global & Cultural Perspectives

Students will understand the general concept of nonparametric statistics and perform a variety of nonparametric statistical analyses. Students will communicate findings with others in a global environment using appropriate statistical and non-statistical language.

III. Major Course Topics

A. Review of Basic Statistical Concepts
   1. One-sample t-test
   2. Two-sample t-test
   3. Analysis of Variance (ANOVA)
   4. Linear Regression Model

B. What is Nonparametric Statistics?
   1. Law of Large Numbers
   2. Central Limit Theorem
   3. Assumptions in Parametric Statistics
   4. Order Statistics

C. Methods Based on the Binomial Distribution, including Confidence Intervals for Medians or Percentiles and Tests for Paired Data
   1. Sign Test
   2. Signed Rank Test

D. Wilcoxon Rank-Sum Test, Wilcoxon Confidence Intervals, etc.
   1. Rank Sum Test
   2. Mann-Whitney U Test
   3. Kruskal-Wallis Test

E. Correlation and Bootstrapping
   1. Pearson's Correlation

2. Kendall’s Tau
3. Spearman’s correlation
4. Estimating Techniques