

University of Arkansas – Fort Smith
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General Syllabus

MATH 21003 Probability and Statistics I

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisites: MATH 11103 College Mathematics and Quantitative Literacy or MATH 11003 College Algebra or required placement score

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

An introductory course in probability and statistics, including statistical terminology, descriptive data, linear regression, probabilities, probability distributions, discrete and random variables, sampling distributions, point and interval estimation, and hypothesis testing. Course is equivalent to PSYC 25133 Introduction to Behavioral Statistics. (ACTS: MATH 2103)

B. Additional Description

Students will utilize graphing calculators to aid in the analysis of data sets.

II. Student Learning Outcomes

A. Subject Matter

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

1. Construct a frequency distribution and histogram for given data.
2. Compute the mean, mode, median, range, variance, and standard deviation for given data.
3. Determine a sample space.
4. Find the probability of a single event, the conditional probability of an event, and the probability of multiple events.
5. Use permutations and combinations to determine probabilities.
6. Find probabilities using the binomial distribution, poisson distribution, hypergeometric distribution, uniform distribution, normal distribution, and the t distribution.
7. Apply the concepts of hypothesis testing, and define Type I and Type II errors.
8. Perform linear regression.

9. Use the central limit theorem and determine probabilities associated with the sampling distribution of sample statistics.
10. Determine a confidence interval for a population mean and a population proportion.
11. Conduct a one-tailed and two-tailed test of a null hypothesis concerning population means and population proportions using the normal distribution and the t-distribution.
12. Conduct tests of hypotheses concerning population variances using the Chi-square distribution and the F-distribution.

B. University Learning Outcomes

Probability and Statistics I enhances student abilities in the following areas.

Analytical Skills

Critical Thinking Skills: Students will identify a problem or issue; research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, and bias relevant to the problems/issues; generate solutions/analysis of problems/issues evaluated; and assess and justify the solutions and/or analysis.

Communication Skills (written and oral)

Students will compose coherent documents which are appropriate for the intended audience and will effectively communicate orally in a public setting, such as presentation for peers or at conferences.

III. Major Course Topics

- A. What Is Statistics?
 1. Introduction to descriptive and inferential statistics
 2. Simple random sampling
 3. Sampling and experimental designs
- B. Descriptive Study of Data
 1. Organizing qualitative and quantitative data
 2. Measures of center and variation
 3. Empirical rule
 4. Five-number summary
- C. Elements of Probability
 1. Probability concepts
 2. Contingency tables
 3. Counting rules
- D. Discrete Probability Distributions
 1. Analysis of discrete random variables
 2. Binomial distributions
 3. Poisson distributions
- E. Basic Concepts of Testing Hypotheses
 1. Null and alternative hypotheses

2. Type I and II errors
3. Tests and confidence intervals
- F. The Normal Distribution and Random Samples
 1. Calculating areas under the standard normal curve
 2. Assessing normality and constructing normal probability plots
- G. Inferences about a Population
 1. Conducting z- and t-tests for one population mean
 2. Constructing confidence intervals for one population mean
- H. Comparing Two Population Means
 1. Hypothesis tests for two population means
 2. Confidence intervals for two population means
 3. Paired-differences tests and intervals for two population means.