University Of Arkansas – Fort Smith
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General Syllabus

STAT 2503H Probability and Statistics I (Honors)

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

Prerequisite: MATH 1303 College Mathematics and Quantitative Literacy or MATH 1403 College Algebra or required placement score
Prerequisite or corequisite: HONR 1101 Introduction to Honors International Studies

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

An introductory course in probability and statistics for students in the honors program, including statistical terminology, descriptive data, linear regression, probabilities, probability distributions, discrete and continuous random variables, sampling distributions, point and interval estimation, and hypothesis testing emphasizing an inquiry based approach and applications to international studies and research. This course satisfies the requirement of MGMT 2963 Business Statistics for business majors in the honors program. (ACTS: MATH 2103)

B. Additional Information

Students will utilize graphing calculators and online resources to aid in the analysis of data sets. This honors course will include inquiry based individual and group projects applying course concepts to topics of general interest in international studies and topics of specific interest to the major area of study of the students. Students will complete a portfolio of major class projects as a course requirement.

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.
13. Apply course concepts and techniques to research and problem solving applied to topics of interest in international studies and the student's major.

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. Infereces 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.