

General Education Course Objectives and Learning Outcomes

Course

Name: Introduction to Statistical Methods

Course Number: STAT 2163

Submitted by: Weijia Jia

Department: Mathematics

COMMON COURSE OBJECTIVES AND STUDENT LEARNING OUTCOMES THAT ARE OR WILL BE LISTED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE:

<i>Course objectives:</i>	This is an introduction to the field of Statistics. The main purpose of this course is to help students understand the concept of a statistical problem and to develop techniques to handle such problems.
<i>Student learning outcomes:</i>	<p>Expected outcomes:</p> <p>At the end of the semester, students should be able to:</p> <ol style="list-style-type: none"> 1. Recognize a statistical problem. 2. Calculate and utilize descriptive statistics for the center of data, as well as, the spread of the data. 3. Also, know basic terminology, like random variables. 4. Utilize basic probability models, distributions, and understand basic probability laws. 5. Construct and interpret confidence intervals. 6. Understand the basics behind hypothesis testing.

ADHE ACTS INFORMATION FOR THIS COURSE (IF APPROPRIATE)

<i>ACTS Course number:</i>	MATH 2103
<i>Copy the ACTS course objectives and learning outcomes:</i>	<p>General Description: Algebra-based course utilizing statistical software covering probability, sampling, the presentation and interpretation of data, basic inference, analysis of variance, correlation and regression. It is recommended that the student should have completed Quantitative literacy/Mathematical Reasoning (MATH1113) or College Algebra (MATH 1103) or the equivalent, with a "C" or better.</p> <p>Expected Student Learning Outcomes:</p> <p>The student will demonstrate a basic understanding of the application of the following topics:</p> <ul style="list-style-type: none"> • Discuss key terminology used with probability and statistics (e.g., population, sample, simple random sampling, random variable, parameter, statistic, etc.). • Calculate and explain probabilities related to complements of events, compound events, and conditional events, utilizing appropriate counting/combinatorial methods as necessary. • Using statistical software, choose, create, and be able to explain tables and/or graphs that represent data in a meaningful way. • Calculate and explain measures of center, measures of variation, and measures of relative standing using a given a data set or distribution. • Discuss the concept and important properties of sampling distributions. <ul style="list-style-type: none"> o This includes discussing the Central Limit Theorem and its applications • Explain the connections between the P-value method, the traditional method, and the confidence interval method of hypothesis testing. • Use statistical software to construct confidence intervals and/or to perform an appropriate

hypothesis test for claims about population parameters and interpret results within a specific research scenario including:

- o One sample proportion test
- o Two sample proportion test
- o One sample t-test
- o Two sample independent t-test
- o Two sample dependent/paired t-test
- o One-way ANOVA
- o Two-way ANOVA
- o Simple Linear Regression/Correlation
- Use statistical software to assess normality of a given data set using QQ-plots and histograms.
 - o All normality requirements of previously discussed inferential procedures can now be assessed
- Use statistical software to identify the best multiple linear regression equation and interpret results within a specific research scenario, while also determining whether the linear regression equation is suitable for making predictions.

WHICH ATU GENERAL EDUCATION GOALS DOES THIS COURSE FULFILL? (NO MORE THAN TWO)

- ✓ Communicate effectively
 - o Written communication
 - o Oral communication
- ✓ Think critically
- Develop ethical perspectives
 - o Diversity
 - o Empathy
 - o Leadership
- ✓ Apply scientific and quantitative reasoning
 - o Scientific reasoning
 - o Quantitative reasoning
- Apply the value of the arts and humanities
- Practice civic engagement

DESCRIPTION OF HOW THIS COURSE MEETS THE GENERAL EDUCATION GOALS CHOSEN ABOVE (TO BE INCLUDED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE)

STAT 2163 Introduction to Statistical Methods addresses three of Arkansas Tech's general education goals.

- **Effective Communication:** Class discussion and course projects are designed to help students apply statistical methods learned in class to make inferences, draw conclusions, and communicate in a scientific and effective way.
- **Critical Thinking:** Statistical and critical thinking are emphasized in the class through lectures, class discussion, course projects, all types of exercises, assignments, and exams.
- **Scientific and quantitative reasoning:** Statistical calculations are introduced in using both traditional method and statistical software. Students apply the quantitative skills trained in the class to solve problems in and beyond classroom.