

# EASTERN ARIZONA COLLEGE

## Introduction to Statistics

Course Design  
2014-2015

**Course Information**

**Division** Social Sciences  
**Course Number** PSY 220  
**Title** Introduction to Statistics  
**Credits** 3  
**Developed by** Adam Stinchcombe  
**Lecture/Lab Ratio** 3 Lecture/0 Lab

**Transfer Status**

ASU	NAU	UA
PSY 230, STP 226, SWU 321, Computer/Stats (CS)  <i>Note: Carries lower-            division credit only</i>	PSY 230  Note: Students will receive 3 units of credit toward NAU's PSY 230 (which is 4 units). PSY majors will need to take an additional unit upon transfer.	PSY 230

**Activity Course** No  
**CIP Code** 42.0101  
**Assessment Mode** Pre/Post Test (20 Questions/100 Points)  
**Semester Taught** Fall and Spring  
**GE Category** Mathematics  
**Separate Lab** No  
**Awareness Course** No  
**Intensive Writing Course** No

**Prerequisites**

MAT 140 or higher with a grade of "C" or higher or placement test score as established by District policy

**Educational Value**

This course will satisfy part of the general education requirements for graduation from EAC as well as other colleges and universities.

**Description**

Introduces statistical methods as applied to collecting, tabulating, analyzing, presenting, and interpreting data. Topics covered include frequency distributions, measures of central tendency, measures of dispersion, elementary probability theory, estimation, hypothesis testing, regression and correlation. A basic course for students in business, behavioral and social sciences. Identical to MAT 160.

## **Supplies**

Scientific Calculator; TI-83 or TI-84 recommended or graphing calculator with extensive statistical features.

## **Competencies and Performance Standards**

### **1. Construct and interpret frequency and relative frequency distributions.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Use a calculator or computer software to construct a frequency, or relative frequency distribution from a given set of data
- b. Discuss the characteristics of a data set as revealed by a frequency, or relative frequency distribution for the data. Compare and contrast distributions.

#### **Performance Standards**

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can use a calculator or computer software to construct a frequency, or relative frequency distribution from a given set of data.
- You can discuss the characteristics of a data set as revealed by a frequency, or relative frequency distribution for the data.

### **2. Calculate measures of central tendency and dispersion for a data set.**

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Use a calculator or computer software to calculate the mean, median, and mode for a data set, and be able to discuss the similarities and differences between these measures of central tendency.
- b. Use a calculator or computer software to calculate the range, variance, and standard deviation for a data set, and be able to discuss the similarities and differences between these measures of dispersion.

#### **Performance Standards**

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can use a calculator or computer software to calculate the mean, median, range, variance, and standard deviation for a data set.

### 3. Determine the probabilities of events.

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Define probability
- b. Determine the probability of an event in a simple probability experiment
- c. Determine the probability of combined independent events
- d. Verify the independence of outcomes using probabilities.

#### **Performance Standards**

*You will demonstrate your competence:*

- o On assigned activities
- o On written exams
- o On a two hour cumulative final exam

*Your performance will be successful when:*

- o You can define probability.
- o You can determine the probability of an event in a simple probability experiment.
- o You can determine the probability of combined independent events.
- o You can determine whether events are dependent or independent.

### 4. Understand binomial probability distributions

#### **Learning objectives**

*What you will learn as you master the competency:*

- a. Identify a binomial experiment.
- b. Use the formula for binomial probabilities to calculate binomial probabilities.
- c. Use technology to find binomial probabilities, and construct binomial probability distributions.
- d. Calculate the mean and the standard deviation for a binomial probability distribution.
- e. Solve probability problems related to binomial experiments.

#### **Performance Standards**

*You will demonstrate your competence:*

- o On assigned activities
- o On written exams
- o On a two hour cumulative final exam

*Your performance will be successful when:*

- o You can define a binomial experiment.
- o You can use the formula for binomial probabilities to calculate binomial probabilities
- o You can use technology to find binomial probabilities, and construct binomial probability distributions.
- o You can calculate the mean and the standard deviation for a binomial probability distribution.

**5. Understand normal probability distributions.**

***Learning objectives***

***What you will learn as you master the competency:***

- a. Sketch a normal probability distribution.
- b. Define the Standard Normal Probability Distribution.
- c. Convert between raw data scores to standardized scores.
- d. Use technology to determine probabilities associated with any normal distribution.
- e. Solve probability problems associated with any normal distribution.

***Performance Standards***

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can sketch a normal probability distribution.
- You can define the Standard Normal Probability Distribution.
- You can convert between raw data scores to standardized scores.
- You can use technology to determine probabilities associated with any normal distribution.
- You can solve probability problems associated with any normal distribution.

**6. Understand sampling distributions and the Central Limit Theorem.**

***Learning objectives***

***What you will learn as you master the competency:***

- a. Define a sampling distribution.
- b. Understand the Central Limit Theorem.
- c. Construct sampling distributions for a mean.
- d. Apply the Central Limit Theorem to find probabilities associated with the sampling distribution for the mean.

***Performance Standards***

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can define a sampling distribution.
- You can understand the Central Limit Theorem
- You can apply the Central Limit Theorem to find probabilities associated with the sampling distribution for the mean.

## 7. Estimate a population parameter.

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Define the terms: confidence level, confidence interval, and error.
- b. Outline the basic procedure for estimating a population parameter.
- c. Determine and interpret a confidence interval for a mean with large samples.
- d. Determine and interpret a confidence interval for a mean with small samples.
- e. Determine and interpret a confidence interval for a proportion.

### **Performance Standards**

*You will demonstrate your competence:*

- o On assigned activities
- o On written exams
- o On a two hour cumulative final exam

*Your performance will be successful when:*

- o You can define the terms: confidence level, confidence interval, and error.
- o You can outline the basic procedure for estimating a population parameter.
- o You can determine and interpret a confidence interval for a mean, given a large sample, using the normal distribution.
- o You can determine and interpret a confidence interval for a mean, given a small sample, using the t-distribution.
- o You can determine and interpret a confidence interval for a proportion.

## 8. Conduct a hypothesis test with one sample

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Define the terms: null hypothesis, alternate hypothesis, level of significance, critical value, and critical region.
- b. Understand and make correct use of the notation associated with conducting a hypothesis test.
- c. Outline the basic procedure for conducting a hypothesis test.
- d. Conduct a hypothesis test for a mean with a large sample.
- e. Conduct a hypothesis test for a mean with a small sample.
- f. Conduct a hypothesis test for a population proportion.

### **Performance Standards**

*You will demonstrate your competence:*

- o On assigned activities
- o On written exams
- o On a two hour cumulative final exam

*Your performance will be successful when:*

- o You can define the terms: null hypothesis, alternate hypothesis, level of significance, critical value, and critical region.
- o You can understand and make correct use of the notation associated with conducting a

hypothesis test.

- You can outline the basic procedure for conducting a hypothesis test.
- You can conduct a hypothesis test for a mean with a large sample.
- You can conduct a hypothesis test for a mean with a small sample.
- You can conduct a hypothesis test for a population proportion.

## 9. Conduct a hypothesis test with two samples

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Conduct a hypothesis test for the difference of means with large independent samples.
- b. Conduct a hypothesis test for the difference of means with small independent samples.
- c. Conduct a hypothesis test for the difference of means with paired samples.
- d. Conduct a hypothesis test for the difference of a population proportion.

### **Performance Standards**

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can conduct a hypothesis test for the difference of means with large independent samples.
- You can conduct a hypothesis test for the difference of means with small independent samples.
- You can conduct a hypothesis test for the difference of means with paired samples.
- You can conduct a hypothesis test for the difference of a population proportion.

## 10. Examine the linear correlation between two variables.

### **Learning objectives**

*What you will learn as you master the competency:*

- a. Define and discuss the least squares line for a data set.
- b. Define and discuss the correlation coefficient for a paired data set.
- c. Use a calculator or computer software to determine the least squares line, and Pearson's correlation coefficient.
- d. Discuss the linear correlation for given set of data.

### **Performance Standards**

*You will demonstrate your competence:*

- On assigned activities
- On written exams
- On a two hour cumulative final exam

*Your performance will be successful when:*

- You can define and discuss the least squares line for a data set.
- You can use a calculator or computer software to determine the least squares line, and

- Pearson's correlation coefficient.
- You can discuss the linear correlation for given set of paired data.

### ***Types of Instruction***

Classroom Presentation

### ***Grading Information***

#### ***Grading Rationale***

Each instructor has the flexibility to develop evaluative procedures within the following parameters.

1. Written exams must represent at least 60% of the final course grade
2. Final exam must represent at least 20% of the final course grade.
3. The Post Test is to be embedded in the final exam and must represent at least 10% of the final course grade.
4. Other activities may represent at most 20% of the final course grade.

#### ***Grading Scale***

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
F	Below 60%