EASTERN ARIZONA COLLEGE
Introduction to Statistics
Course Design
2018-2019

Course Information

Division Mathematics

Course Number MAT 160 (SUN# MAT 1160)

Title Introduction to Statistics

Credits 3

Developed by Adam Stinchcombe

Lecture/Lab Ratio 3 Lecture/0 Lab

Transfer Status

ASU	NAU	UA
ECN 221, STP 226, Computer/Stats (CS)	STA 270; Science & Applied Science [SAS] NAU Personalized Learning: STAT 271; Science & Applied Science [SAS]	MATH 163

Activity Course No

CIP Code 27.0101

Assessment Mode Final Exam (20 Questions/100 Points)

Semester Taught Fall and Spring

GE Category Mathematics

Separate Lab No

Awareness Course No

Intensive Writing Course No

Diversity and Inclusion Course No

Prerequisites

MAT 140 or higher with a grade of "C" or higher or placement test score as established by District policy and ENG 091 with a grade of “C” or higher or reading 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 PSY 220.

Supplies

TI-84 graphing calculator

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:

- learner can use a calculator or computer software to construct a frequency, or relative frequency distribution from a given set of data
- learner 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:

- learner 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:

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

Your performance will be successful when:

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

4. Identify properties of 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:

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

Your performance will be successful when:

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

5. Identify properties of 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:

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

6. Determine characteristics of sampling distributions and the Central Limit Theorem.

Learning objectives

What you will learn as you master the competency:

a. Define a sampling distribution.

b. Implement 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:

- learner can define a sampling distribution
- learner can properly implement the Central Limit Theorem
- learner 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:

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

Your performance will be successful when:

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

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

Your performance will be successful when:

- learner can define the terms: null hypothesis, alternate hypothesis, level of significance, critical value, and critical region
- learner can identify and use correct notation associated with conducting a hypothesis test
- learner can outline the basic procedure for conducting a hypothesis test
- learner can conduct a hypothesis test for a mean with a large sample
- learner can conduct a hypothesis test for a mean with a small sample
- learner 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:

- learner can conduct a hypothesis test for the difference of means with large independent samples
- learner can conduct a hypothesis test for the difference of means with small independent samples
- learner can conduct a hypothesis test for the difference of means with paired samples
- learner 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:

- learner can define and discuss the least squares line for a data set
- learner can use a calculator or computer software to determine the least squares line, and Pearson's correlation coefficient
- learner 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. 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%