



**COWLEY COLLEGE  
& Area Vocational Technical School**

**COURSE PROCEDURE FOR**

<p><b>ELEMENTARY STATISTICS MTH 4423    3 Credit Hours</b></p>
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**Student Level:**

This course is open to students on the college level in the freshman year.

**Catalog Description of the Course:**

**MTH4423 - ELEMENTARY STATISTICS (3 hrs)**

**[KRSN MAT 1020]**

An introduction to frequency distributions, measures of central tendency, sampling distribution, t-test and chi-square test, hypothesis testing, and correlation coefficients. This course requires that the student furnish his or her TI-83 or TI-84 series-graphing calculator.

**Prerequisite:**

A minimum grade of C in MATH 4420 College Algebra.

**Controlling Purpose:**

To introduce students to the fundamentals of analyzing statistical data from diverse areas of interest.

**Units Outcomes and Criterion Based Evaluation Key for Core Content:**

The following defines the minimum core content not including the final examination period. Instructors may add other content as time allows.

Evaluation Key:

- A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field.
- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area.

**CHAPTER 1 INTRODUCTION TO STATISTICS****Section 1.1–1.6**

Outcomes: Students will discover the nature of statistics and data uses and abuses of statistics, design of experiments, good sampling methods.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Distinguish between a population and a sample.
							Distinguish between a parameter and a statistic.
							Identify the level of measurement of a set of data.
							Recognize the importance of good sampling methods and the serious deficiency of poor sampling methods.
							Understand the importance of good experimental design, including the control of variable effects, sample size, and randomization.

**CHAPTER 2 – 3 DESCRIBING, EXPLORING, AND COMPARING DATA Section 2.1 – 3.5**

Outcomes: The student will be able to consider methods for describing, exploring, and comparing data sets.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Summarize the data by constructing a frequency table or relative frequency table.
							Construct a histogram dot plot, stem-and leaf plot, pie chart, and Pareto chart.
							Calculate measures of center by finding mean, median, mode, and midrange.
							Calculate measures of variation by finding standard deviation, variance, and range.
							Calculate individual values by using z scores, quartiles, deciles, or percentiles.
							Investigate and explore the spread of data, the center of data, and the range of values by constructing a box plot.

**Chapter 4 CORRELATION AND REGRESSION****Sections 4.1-4.4, 14.3**

Outcomes: The student should be able to investigate relationships and correlations between two or more variables.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Use scatter diagrams and linear correlation coefficient to decide whether there is a linear correlation between two variables.
							Use methods for finding the equation of the regression line.
							Use the concept of total variation with components of explained and unexplained variation.
							Determine procedure for obtaining a multiple regression equation.
							Explore the basic concepts of developing a mathematical model including nonlinear functions.

**CHAPTER 5 PROBABILITY****Sections 5.1 – 5.6**

Outcomes: The student will understand the basic concepts of probability theory including notation, basic definitions, addition rule, multiplication rule, fundamental counting rule, factorial rule, permutations rule, and combinations rule.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Understand basic definitions and notation.
							Understand the probability of any event.
							Find the complement of an event.
							Use of the addition rule for compound events.
							Use of the multiplication rule for compound events.
							Use of the following counting techniques: fundamental counting rule, factorial rule, permutations rule, combinations rule.

\*DENOTES OPTIONAL MATERIAL

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**CHAPTER 6 DISCRETE PROBABILITY DISTRIBUTIONS****Section 6.1–6.3**

Outcomes: The student will understand the concept of probability and binomial distributions including random variables, computing mean and standard deviation, constructing a probability distribution; and the Poisson probability distribution.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Understand a random variable has values that are determined by chance.
							Understand a probability distribution consists of all values of a random variable along with their corresponding probabilities.
							Compute the mean and standard deviation to explore a binomial distribution.
							Compute the mean and standard deviation to explore a probability distribution.
							Understand that with a binomial distribution there are two categories of outcomes and a fixed number of independent trials with a constant probability.
							Compute a Poisson probability distribution which applies to occurrences of some event over a specific interval, and its probabilities.

**CHAPTER 7-8 NORMAL PROBABILITY DISTRIBUTIONS****Sections 7.1 – 8.2**

Outcomes: The student will understand continuous probability distributions and focus on the most important category: normal distributions.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Graph a normal distribution.
							Use a Normal distribution to approximate a Binomial Distribution.
							Convert values to standard scores (z scores).
							Verify the solution(s) of the normal distribution.
							Utilize the Central Limit Theorem.
							Understand the Rare Event Rule.
							Utilize the continuity Corrections procedure.

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**CHAPTER 7-8 NORMAL PROBABILITY DISTRIBUTIONS****Sections 7.1 – 8.2**

Outcomes: The student will understand continuous probability distributions and focus on the most important category: normal distributions.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Determine whether data have a Normal distribution.

**CHAPTER 9 ESTIMATES AND SAMPLE SIZES****Sections 9.1 – 9.5**

Outcomes: The student will understand the fundamental and important concepts of inferential statistics with a focus on methods for finding estimates of population means, proportions, and variances and develop procedures for finding point estimate, confidence interval, and required sample size.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Interpret a Confidence Interval
							Find Critical Values
							Determine the Margin of Error.
							Find the Point Estimate and $E$ from a Confidence Interval.
							Use a Confidence Interval to describe, explore, and compare data.
							Estimate the Proportion $p$ .
							Estimate a Population Mean: Large and Small Samples.
							Estimate a Population Variance.
							Use properties of the distribution of the Chi-Square Statistic.
							Find the confidence interval (or interval estimate) for the Population Variance.
							Determine the sample size.

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**CHAPTER 10 HYPOTHESIS TESTING****Sections 10.1 – 10.7**

Outcomes: The student will be able to present methods for testing claims about a population mean, proportion, standard deviation, and variance and draw a conclusion.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Understand the fundamentals of hypothesis testing.
							Determine the null and alternative hypotheses.
							Find critical values.
							Determine whether it is a two-tail, left-tail, or right-tail test.
							Draw a conclusion from the hypothesis test.
							Use steps in testing a hypothesis.
							Determine the <i>P</i> -Value of testing hypothesis.
							Test claims with confidence intervals.
							Test claims with proportions.
							Test a claim about a mean: large and small samples.
							Test a claim about a standard deviation or variance.

**CHAPTER 11 INTERENCES FROM TWO SAMPLES****Sections 11.1 – 11.5**

Outcomes: The student should be able to do hypothesis tests considering two samples drawn from two populations.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Draw inferences about two proportions.
							Draw inferences about two means: Independent and large Samples.
							Draw inferences about two means: Independent and Large Samples; matched Pairs; Independent and Small Samples.
							Determine confidence Interval Estimates.

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**CHAPTER 11 INTERENCES FROM TWO SAMPLES****Sections 11.1 – 11.5**

Outcomes: The student should be able to do hypothesis tests considering two samples drawn from two populations.

A	B	C	D	F	N		Specific Competencies
							Demonstrate the ability to:
							Compare Variation in two samples.

**Projects Required:**

None

**Text Book:**

Contact the Bookstore for current textbook.

**Materials/Equipment needed:**

Text, Graphing Calculator (TI-83/84 Series)

**Attendance Policy:**

Students should adhere to the attendance policy outlined by the instructor in the course syllabus,.

**Grading Policy:**

A minimum 40% of the course grade shall consist of proctored assessment(s) of which at least 20% of the course grade shall include a comprehensive departmental final exam.

**Maximum Class Size:**

Based on classroom occupancy

**Course Timeframe:**

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

**Learner Outcomes:**

Students who complete this course with a grade of A or B should be able to interpret sets of statistical data and understand the interpretations made by others.

The learning outcomes and competencies detailed in this course meet, or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Project for this course, as sanctioned by the Kansas Board of Regents.

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**Refer to the following policies:**

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

**Disability Services Program:**

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability which may impact work in this class which requires accommodations, contact the Disability Services Coordinator.