CENTRAL TEXAS
COLLEGE SYLLABUS
FOR MATH 1342
ELEMENTARY STATISTICAL
METHODS

Semester Hours Credit:  3

INSTRUCTOR: _____________________

OFFICE HOURS: _________________

I. INTRODUCTION

A. MATH 1342, Elementary Statistics, is a three-semester-hour introductory course in statistics. The general aim of the course is to provide the background for the application of statistical methods in many fields. The primary emphasis will be placed on using statistical techniques to correctly describe particular sets of data. Techniques include collection, analysis, presentation and interpretation of data, and probability. Analysis includes descriptive statistics, correlation and regression, confidence intervals and hypothesis testing, and use of appropriate technology.

B. This course is occupationally related and serves as preparation for careers in social sciences, sciences, and business.

C. In support of the objectives of the Texas core curriculum, the course provides significant exercise of students’ critical thinking, communication skills, empirical and quantitative skills, and teamwork. These objectives form a foundation of intellectual and practical skills that are essential for all learning.

1. Critical thinking skills include creative thinking, innovation inquiry, and analysis, evaluation and synthesis of information
2. Communication skills include effective development, interpretation and expression of ideas through written, oral and visual media.
3. Empirical and quantitative skills include the ability to manipulate and analyze numerical data or observable facts to reach informed conclusions.

D. Prerequisite: DSMA 0303 or equivalent placement score.

II. LEARNING OUTCOMES

Upon successful completion of this course, Elementary Statistical Methods, students will:
A. Explain the use of data collection and statistics as tools to reach reasonable conclusions. (F2, F6, F8, F9, F10)

B. Recognize, examine and interpret the basic principles of describing and presenting data. (F1, F5, F8, F9, F10)

C. Compute and interpret empirical and theoretical probabilities using the rules of probabilities and combinatorics. (F1, F2, F3, F8, F9, F10)

D. Explain the role of probability in statistics. (F2, F6, F7)

E. Examine, analyze and compare various sampling distributions for both discrete and continuous random variables. (F1, F2, F3, F5, F6, F7, F8, F9, F10)

F. Describe and compute confidence intervals. (F1, F2, F3, F6, F7, F8, F9, F10)

G. Solve linear regression and correlation problems. (F1, F2, F3, F7, F8, F9, F10)

H. Perform hypothesis testing using statistical methods. (F1, F2, F3, F5, F7, F8, F9, F10)

I. Use electronic and other media, such as the computer, to reinforce and supplement the learning process. (F1, F2, F3, F4, F6)

J. Demonstrate critical thinking, communication, and empirical and quantitative skills. (F1, F2, F3, F5, F6, F7, F8, F9, F10)

III. INSTRUCTIONAL MATERIALS

The Instructional materials identified for this course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS

A. Assignments are given in MyMathLab (MML) and are due as scheduled by your instructor. The instructor will monitor students’ progress in completing the assignments.

B. Students are expected to attend every class, to arrive at each class on time, and remain in class for the entire period. Instructors may choose to lower a student's grade because of tardiness.

V. EXAMINATIONS
A. Examinations will be given at appropriate points during the semester. Each examination will be announced in class in advance. There will be three examinations (including the final).
B. Students who miss an exam should discuss with the instructor the circumstances surrounding the absence. The instructor will determine whether a make-up exam is to be given. It is necessary to make an appointment with the instructor for a make-up exam.

VI. SEMESTER GRADE COMPUTATIONS
The semester average is derived from the homework, quizzes, Chapter Applications, unit exams, and REQUIRED comprehensive final exam in MyMathLab. You must take the final exam and score at least 50% to pass the course.

Final grades will follow the grade designation below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Class Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A”</td>
<td>90 to 100</td>
</tr>
<tr>
<td>“B”</td>
<td>80 to 89</td>
</tr>
<tr>
<td>“C”</td>
<td>70 to 79</td>
</tr>
<tr>
<td>“D”</td>
<td>60 to 69</td>
</tr>
<tr>
<td>“F”</td>
<td>0 to 59</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS
A. Withdrawal from Course: It is the student's responsibility to officially drop a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file an Application for Withdrawal or an Application for Refund. The withdrawal form must be signed by the student.

An Application for withdrawal will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is as follows:

<table>
<thead>
<tr>
<th>Session</th>
<th>Deadline for Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-week session</td>
<td>Friday of the 9th week</td>
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<tr>
<td>10-week session</td>
<td>Friday of the 7th week</td>
</tr>
<tr>
<td>8-week session</td>
<td>Friday of the 6th week</td>
</tr>
<tr>
<td>6-week session</td>
<td>Friday of the 4th week</td>
</tr>
<tr>
<td>5-week session</td>
<td>Friday of the 3rd week</td>
</tr>
</tbody>
</table>

The equivalent date (75% of the semester) will be used for sessions of other lengths.
The specific last day to withdraw is published each semester in the Schedule Bulletin.

Students who officially withdraw will be awarded the grade of "W" provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of "F" or "FN" for nonattendance.

B. **An Incomplete Grade:** The College catalog states, "An incomplete grade may be given in those cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course..." Prior approval from the instructor is required before the grade of "I" is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an "F" for the course.

C. **Cellular Phones and beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

D. **Americans With Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Review the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

E. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

F. **Advanced Math Lab:** The Math Department operates an Advanced Mathematics Lab in Building 152, Room 145. All courses offered by the Math Department are supported in the lab with appropriate tutorial software. Calculators are available for student use in the lab. Students are encouraged to take advantage of these opportunities. See posted hours for the Advanced Math Lab.

G. **Office Hours:** Full-time instructors post office hours outside the door of the Mathematics Department (Building 152, Room 223). Part-time instructors may be available by appointment. If you have difficulty with the course work, please consult
your instructor.

VIII. COURSE OUTLINE

A. Lesson One: Introduction to Statistics

1. Learning Outcomes: Upon successful completion of this lesson, the student will be able to:

   a. Define statistics.
   b. Distinguish between a population and a sample, a parameter and a statistic, descriptive statistics and inferential statistics, as well as qualitative and quantitative data.
   c. Classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio.
   d. Design a statistical study and an experiment.
   e. Distinguish between an observational study and an experiment.
   f. Collect data by using a survey or simulation.
   g. Create a sample using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling.
   h. Identify a biased sample.

2. Learning Activities:

   a. Read pages of assigned chapter. (F1)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)

3. Lesson Outline:

   a. Section 1.1 (An Overview of Statistics)
   b. Section 1.2 (Data Classification)
   c. Section 1.3 (Data Collection and Experimental Design)

B. Lesson Two: Descriptive Statistics

1. Learning Outcomes: Upon successful completion of this lesson, the student will be able to:

   a. Construct frequency distributions, frequency histograms, frequency polygons, relative frequency histograms, and ogives.
   b. Graph and interpret quantitative data sets using stem-and-leaf
plots and dot plots.
c. Graph and interpret qualitative data sets using pie charts and Pareto charts.

d. Graph and interpret paired data sets using scatter plots and time series charts.
e. Calculate the mean, median, and mode of a sample and population.
f. Calculate a weighted mean and the mean of a frequency distribution.
g. Describe the shape of a distribution as symmetric, uniform, or skewed; and compare the mean and median for each distribution.
h. Find the range of a data set; and the variance and standard deviation of a population and of a sample.
i. Use the Empirical Rule and Chebychev’s Theorem to interpret standard deviation.
j. Approximate the sample standard deviation for grouped data.
k. Use the coefficient of variation to compare variation in different data sets.
l. Find the first, second, and third quartiles of a data set, as well as the interquartile range.
m. Represent a data set graphically using a box-and-whisker plot.
n. Find and interpret other fractiles such as percentiles, as well as the standard score (z-score).

2. Learning Activities:

a. Read pages of assigned chapter. (F1)
b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
c. Work section, chapter, and computer problems assigned by the instructor. (F2, F7, F8, F9, F10, F11, F12)

3. Lesson Outline:

a. Section 2.1 (Frequency Distributions and Their Graphs)
b. Section 2.2 (More Graphs and Displays)
c. Section 2.3 (Measures of Central Tendency)
d. Section 2.4 (Measures of Variation)
e. Section 2.5 (Measures of Position)

C. Lesson Three: Probability

1. Learning Outcomes: Upon successful completion of this lesson, the student will be able to:
a. Identify simple events and the sample space of a probability experiment.
b. Use the Fundamental Counting Principle to find the number of ways two or more events can occur.
c. Distinguish among classical probability, empirical probability, and subjective probability.
d. Find the probability of the complement of an event.
e. Use the tree diagram and the Fundamental Counting Principle to find probabilities.
f. Distinguish between independent and dependent events.
g. Use the Multiplication Rule to find the probability of two or more events occurring in sequence.
h. Calculate the probability of an event given that another event has occurred.
i. Determine whether two events are mutually exclusive.
j. Use the Addition Rule to find the probability of two events.
k. Find the number of ways a group of objects can be arranged in order.
l. Find the number of ways to choose several objects from a group without regard to order.
m. Use counting principles to find probabilities.

2. Learning Activities:
   a. Read pages of assigned chapter. (F1)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)

3. Lesson Outline:
   a. Section 3.1 (Basic Concepts of Probability and Counting)
   b. Section 3.2 (Conditional Probability and the Multiplication Rule)
   c. Section 3.3 (The Addition Rule)
   d. Section 3.4 (Additional Topics in Probability and Counting)

D. Lesson Four: Discrete Probability Distributions

1. Learning Outcomes: Upon successful completion of this lesson, the student will be able to:
   a. Distinguish between discrete and continuous random variables.
   b. Construct and graph a discrete probability distribution.
   c. Determine if a distribution is a probability distribution.
   d. Calculate the mean, variance, standard deviation, and the expected value of a discrete probability distribution.
   e. Determine whether a probability experiment is a binomial experiment.
   f. Find binomial probabilities using the binomial probability formula, technology, formulas, and a binomial probability table.
   g. Construct and graph a binomial distribution.
h. Find the mean, variance, and standard deviation of a binomial probability distribution.
i. Find probabilities using the geometric distribution.
j. Find probabilities using the Poisson distribution.

2. **Learning Activities:**
   a. Read pages of assigned chapter. (F1)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**
   a. Section 4.1 (Probability Distributions)
   b. Section 4.2 (Binomial Distributions)
   c. Section 4.3 (More Discrete Probability Distributions)

E. **Lesson Five: Normal Probability Distribution**

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:
   a. Interpret graphs of normal probability distributions.
   b. Find areas under the standard normal curve.
   c. Find probabilities for normally distributed variables using a table and using technology.
   d. Determine the z-score given the area under the normal curve.
   e. Transform a z-score to an x-value.
   f. Find a specific data value of a normal distribution given the probability.
   g. Find sampling distributions and verify their properties.
   h. Interpret the Central Limit Theorem.
   i. Calculate a specific data value given the probability.
   j. Apply the Central Limit Theorem to find the probability of a sample mean.

2. **Learning Activities:**
   a. Read pages of assigned chapter. (F2)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**
   a. Section 5.1 (Introduction to Normal Distributions and the Standard Distribution)
b. Section 5.2 (Normal Distributions: Finding Probabilities)  
c. Section 5.3 (Normal Distributions: Finding Values)  
d. Section 5.4 (Sampling Distributions and the Central Limit Theorem)  

F. **Lesson Six:** Confidence Intervals  

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:  
   a. Calculate a point estimate and a margin of error for the population proportion.  
   b. Construct and interpret confidence intervals for a population mean when \( \sigma \) is known.  
   c. Determine the minimum sample size required when estimating a population mean.  
   d. Interpret the t-distribution and use a t-distribution table.  
   e. Construct and interpret confidence intervals for a population mean when \( \sigma \) is not known.  
   f. Find a point estimate for a population proportion.  
   g. Construct and interpret confidence intervals for a population proportion.  
   h. Determine the minimum sample size required when estimating a population proportion.  

2. **Learning Activities:**  
   a. Read pages of assigned chapter. (F1)  
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)  
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)  

3. **Lesson Outline:**  
   a. Section 6.1 (Confidence Intervals for the Mean: \( \sigma \) Known)  
   b. Section 6.2 (Confidence Intervals for the Mean: \( \sigma \) Unknown)  
   c. Section 6.3 (Confidence Intervals for Population Proportions)  

G. **Lesson Seven:** Hypothesis Testing with One Sample  

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:  
   a. State a null hypothesis and an alternative hypothesis.  
   b. Identify Type I and Type II errors.  
   c. Interpret the level of significance.  
   d. Determine when to use a one-tailed or two-tailed statistical test.  
   e. Find and interpret P-values.  
   f. Make decisions based on the results of a statistical test.
g. Write a claim for a hypothesis test.
h. Use P-values for a z-test for a mean $\mu$ when $\sigma$ is known.
i. Find critical values and rejection regions in the standard normal distribution.
j. Use rejection regions for a z-test for a mean $\mu$ when $\sigma$ is known.
k. Find critical values in a t-distribution.
l. Use technology to find P-values and use them with a t-test to test a mean $\mu$ when $\sigma$ is not known.
m. Use the z-test to test a population proportion $p$.

2. **Learning Activities:**
   a. Read pages of assigned chapter. (F1)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)

3. **Lesson Outline:**
   a. Section 7.1 (Introduction to Hypothesis Testing)
   b. Section 7.2 (Hypothesis Testing for the Mean: $\sigma$ Known)
   c. Section 7.3 (Hypothesis Testing for the Mean: $\sigma$ Unknown)
   d. Section 7.4 (Hypothesis Testing for Proportions)

H. **Lesson Eight: Correlation and Regression**

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:
   a. Calculate a correlation coefficient.
   b. Test a population correlation coefficient using a table.
   c. Distinguish between correlation and causation.
   d. Construct the equation of a regression line.
   e. Predict y-values using a regression equation.
   f. Interpret the three types of variation about a regression line.
   g. Find and interpret the coefficient of determination.
   h. Find and interpret the standard error of estimate for a regression line.
   i. Construct and interpret a prediction interval for $y$.

2. **Learning Activities:**
   a. Read pages of assigned chapter. (F1)
   b. Listen to classroom lecture and discuss exercises. (F5, F6, F7, F8)
   c. Work section, chapter, and computer problems assigned by instructor. (F2, F7, F8, F9, F10, F11, F12)
3. **Lesson Outline:**
   a. Section 9.1 (Correlation)
   b. Section 9.2 (Linear Regression)
   c. Section 9.3 (Measures of Regression and Prediction Intervals)