STUDENT COURSE INFORMATION SHEET
STATISTICAL APPLIC. IN SOCIAL SCIENCE I

I.   **COURSE DESCRIPTION:**
        STA2122: STATISTICAL APPLIC. IN SOCIAL SCIENCE I, 4 hours lecture, and 4 credits.
        Prerequisite: Math placement test score (PERT: 123-137 (or) Accuplacer Algebra: 88-120 (or) SAT Math: 450-479 (or) SAT Math: 24.5 (or) ACT Math: 20-22) or minimum grade of "C" in MAT 1033.
        An introductory course which includes: probability distributions, hypothesis testing, confidence interval estimation, correlation, analysis of variance, and regression.

II.   **TEXT:** Elementary Statistics, Larson, 6th edition, 2015, Pearson.
        OTHER MATERIALS: A calculator (TI-83, TI-84 etc.) can be used in the course. Students might be expected to use computers and appropriate software, such as Activstats, Excel, SPSS, and Minitab where available for the completion of projects.

III.   **GENERAL COURSE OBJECTIVES:**
        The student should:
        1.   Gain knowledge in the topics considered by the state to comprise STA2122 (elementary statistics)
        2.   be aware of the capabilities and limitations of statistical methods
        3.   Acquire knowledge to prepare for more advanced courses in statistics
        4.   Acquire skill necessary to apply these methods to real world applications
        5.   Describe the goals of various statistical methodologies conceptually
        6.   Acquire skill necessary to apply these methods to research problems
        7.   Select appropriate statistical tools to analyze a particular problem
        8.   Understand different sampling strategies
        9.   be able to summarize data using descriptive statistics
        10.   Make valid judgments using inferential statistical methods

IV.   **COURSE OUTLINE:** See the attached daily schedule for a detailed outline.
        SPECIAL ASSIGNMENT: The student will be required to identify case studies utilizing the techniques presented in class. The instructor will provide details.

V.   **ATTENDANCE-WITHDRAWAL-GRADE FORGIVENESS-ATTEMPTS:**
        A.   **Attendance Policy:**
               Attendance in class is vital to your success and is positively correlated with your final grade. Furthermore, attendance with participation is even more highly correlated with your final grade. Please ensure that you are present and participating at each class session. Attendance will be recorded each day and you are expected to attend. If you do not attend class for the first two weeks, you will be withdrawn for non-attendance. **YOU MUST ATTEND ON EACH TEST OR EXAM DAY.**
        B.   **Withdrawal Policy:**
               Two withdrawals are permitted per course. After that, a grade will be assigned. Please be concerned about withdrawals. When admitting students into certain programs, universities may calculate withdrawals as grades. There are two kinds of withdrawals, student and administrative.
               1. By Student (Student cannot initiate withdrawal after current semester Withdrawal Deadline)
                      a)   Student completes a withdrawal form.
                      b)   Student then submits the form to the Office of Admissions and Records.

      2. Administrative Withdrawal
        a)   This withdrawal is completed by an instructor for excess absences.
        b)   Instructor then submits the form to the Office of Admissions and Records.
Withdrawals initiated prior to the published withdrawal deadline will be recorded as "W". After the withdrawal deadline, a student cannot be withdrawn from the course and will receive a grade. The second unit test in Distance Education courses is midterm.

C.   Grade Forgiveness:
A student may repeat a course when a grade of "D" or "F" has been earned. The last grade counts. However, universities may count forgiven grades in calculating the grade point average. Forgiven grades may also be calculated in determining financial aid eligibility.

D.   Attempts:
This course, which is a college credit course, may be attempted three times. On the third attempt, 100% of the full cost of instruction will be charged. Students with major extenuating circumstances may submit a letter of appeal stating the circumstances to the dean of students. All grades from the third and subsequent attempts will be calculated in the grade point average.

VI.   HOMEWORK:
Homework will be assigned daily. The daily completion of all homework is essential for learning the material in the course and as preparation for the examinations.

VII.   TESTING:
There will be four unit tests given. The unit tests will be announced in advance, will count equally, and will be returned. The final exam is comprehensive and **will not** be returned. There are **no exemptions** from the final exam. At the option of the instructor unannounced "pop-quizzes," projects, case studies, and/or outside computer assignments may be given. The average of these optional assignments should count no more than one unit test. Therefore, the number of grades counted as a unit test will be five (5). The student is expected to keep up daily with the assigned work.

Students will not be allowed to leave a testing situation and come back at a later time to finish the test. Students will not be allowed to "retake" a unit test, midterm, or final exam.

VIII.   GRADING:
A comprehensive final exam (no exemptions) will count 25% of your grade. The college catalog will be used to convert the numerical average to a letter grade. The college grading scale is: A (100-90), B (89-80), C (79-70), D (69-60), and F (59-0)

IX.   MAKE UP WORK:
No daily quizzes will be made up. If you miss a unit test and you have a valid excuse, your final grade may count as the first missing unit test grade. If you miss more than one unit test, you may take a make-up test at the discretion of the instructor. If you have not missed any unit tests, the final exam, may be used to replace the lowest unit test grade.

X.   OTHER:
Disability Statement: Gulf Coast State College supports an inclusive learning environment for all students. If there are aspects of the instruction or design of this course that hinder your full participation, reasonable accommodations can be arranged. Prior to receiving accommodations, you must register with Disability Support Services. Appropriate academic accommodations will be determined based on the documented needs of the student. For information regarding the registration process, email dss@gulfcoast.edu or call 850-769-1551, Ext. 6071.

Studying requires discipline, tenacity, and hard work. View this course as a job. Attendance is absolutely necessary, as well as attentiveness to detail and alertness. You must earn a "C" in this course in order to receive credit.

The Pay4Print system is installed in all computer labs and in the library. The logon to the system can be found by going to www.gulfcoast.edu and clicking on Student Resources and then on Pay4Print. The logon will be the same logon ID as the student email, using only the initials and randomly generated number. Students will be required to add money to their print accounts before they are able to print. Money can be added to student print accounts by credit or debit card with a minimum of $5.00 or at patron kiosks or bill acceptors.

XI.   Available Help:
1.   Your Instructor
Full time faculty have posted ten (10) hours per week on their schedule. Their offices are located in the Student Union West on the 2nd floor (SUW). Adjunct faculty are available for assistance 30 minutes before or after class. Students having difficulty are strongly encouraged to see the instructor for additional help.

2.   Specific Course Objectives
Specific Course Objectives are available upon request. These objectives are posted on the Mathematics' Web Site.

3.   Course Videos
Course videos for STA 2023 are available on Canvas. While these videos are not primarily intended for STA 2122 students, there is overlap in the topics covered and both courses use the same textbook.

4.   Math Lab
The Math Lab is available in room SUW 260 and 261 for tutoring during the week (see door for hours).

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CLASSROOM CONDUCT POLICY

In order to promote a learning environment, in which you as a student may receive the greatest consideration, we will do all we can to prevent unnecessary interruptions and class disruptions. To this end, it is the stated policy of the Division of Mathematics that disruptions, <u>absolutely and unequivocally</u>, will not be tolerated in the classrooms administered by this division. To this end, we remind you that the **instructors are obligated** to adhere strictly to the following policies:

1. <u>Everyone is required to be in class on time</u>.
   Anyone entering the classroom after the instructor has begun class is late and is a disruption to the class. The instructor must implement an appropriate policy to discourage late arrivals.

2. <u>Disciplinary action in the case of cheating will be administered in accordance with college policy.</u> Do not cheat.

3. <u>The student must have prior consent of the instructor before leaving the class early</u>.
   If you must leave class early, notify the instructor before the beginning of class. We do not conduct "open" classrooms where individuals may arrive and exit at their discretion. This activity is disruptive to those trying to learn and will not be allowed. If you leave early without prior notification to the instructor, you will not be allowed back in the classroom without first obtaining permission from Mrs. Reynolds, Division of Mathematics Chair.

4. The instructor is not to allow talking or other distractions to occur at inappropriate times. **Use of electronic communication devices** (including, but not limited to, cell phones, Ipods, PDA's, MP3/Music players, Blackberries, etc.) are allowed in the classroom only at the discretion of the instructor and must be used only as they directly relate to the class. Talking or other disruptive behavior (including ringing cell phones) are distractions to other students and have no place in a college environment. Students who engage in such behavior will be asked to stop. If the behavior continues, the student(s) will be asked to leave and confer with Mrs. Reynolds, Division of Mathematics Chair, concerning the nature of the behavior before being allowed back in the classroom. **NO** electronic devices will be allowed in the classroom on test days with the exception of an approved calculator.

5. **No food or drink** is allowed in the classroom.

6. <u>Infractions of discipline may be handled by the instructor as final authority</u>.
   The student has a right to appeal.

1. Students will learn and understand the definitions of statistical terms regarding data, probability, descriptive statistics, sampling and inferential statistics.

2. Students will be able to read and interpret statistical graphs of various kinds; including, but not limited to, histograms, stem and leaf displays, boxplots and scatterplots.

3. Student will be able to construct statistical graphs by hand or with technology as appropriate.

4. Students will be able to understand and apply the principles of probability to given situations (experiments).

5. Students will recognize and understand different types of discrete random variables including binomial and geometric random variables and be able to calculate parameters and probabilities associated with these random variables.

6. Students will recognize and understand continuous random variables including the normal distribution, student's t-distribution, Fisher's F-distribution and Chi-square distribution.

7. Students will understand the results of the central limit theorem and be able to apply those concepts/results to real- world situations.

8. Student will understand the concept of confidence intervals and the underlying theory.

9. Students will be able to construct and interpret confidence intervals including intervals for means and proportions, and calculate sample sizes to achieve certain levels of confidence.

10. Students will understand to components of a hypothesis testing including null and alternative hypothesis, test statistics, critical regions, p-values, type I and type ii errors, power of a test and significance level.

11. Student will be able to perform hypothesis test on proportions, means, more than one proportion, and more than one mean.

12. Students will understand the concept of linear correlation and be able to calculate and interpret the correlation coefficient. Students will also be able to calculate and interpret the coefficient of determination.

13. Students will understand the concepts of linear regression including slope, y-intercept, influential points, outliers and residuals. The student will also be able to calculate the statistics for linear regression and understand how to apply the regression equation.

14. Students will understand how to construct confidence intervals and perform hypothesis tests on the elements of the regression equation.

15. Students will recognize and understand multinomial situations and be able to perform multinomial hypothesis test including Goodness-of-fit tests and test of independence on contingency tables.

16. Students will be able to perform one-way and two-way ANOVA tests using technology and interpret the results of the tests.

1.1   An Overview of Statistics
   a.   The definition of statistics.
   b.   Distinguish between a population and a sample.
   c.   Distinguish between a parameter and a statistic.
   d.   Distinguish between descriptive and inferential statistics.

1.2   Data Classification
   a.   Distinguish between qualitative and quantitative data.
   b.   Classify data as nominal, ordinal, interval, and ratio.

1.3   Data Collection and Experimental Design
   a.   Design a statistical study.
   b.   Collect data by doing an observational study, performing an experiment, using a simulation, or using a survey.
   c.   Design an experiment.
   d.   Create a sample.

2.1   Frequency Distributions and Their Graphs
   a.   Construct a frequency distribution.
   b.   Construct a frequency histogram.

2.2   More Graphs and Displays
   a.   Graph and interpret quantitative data.
   b.   Graph and interpret qualitative data.

2.3   Measures of Central Tendency
   a.   Find the mean, median, and mode.
   b.   Describe the shape of a distribution.

2.4   Measures of Variation
   a.   Find the range, standard deviation, and variance.
   b.   Use the Empirical Rule.
   c.   Use Chebychev's Theorem.
   d.   Approximate the sample standard deviation.

2.5   Measures of Position
   a.   Find the first, second, and third quartiles as well as the interquartile range of a data set.
   b.   Determine outliers.
   c.   Construct box plots.
   d.   Interpret percentiles.
   e.   Find and interpret z-scores.

SPECIFIC COURSE OBJECTIVES
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3. 1   **Basic Concepts of Probability and Counting**
- a. Identify sample space and simple events.
- b. Use the Fundamental Counting Principle to find number of events.
- c. Distinguish between classical, empirical, and subjective probability.
- d. Find the probability of a complement of an event.
- e. Use a tree diagram to find probability.

3.2   **Conditional Probability and the Multiplication Rule**
- a. Find the probability of an event, given another event has occurred.
- b. Distinguish between independent and dependent events.
- c. Use the Multiplication Rule to find the probability of a sequence of events.
- d. Use the Multiplication Rule to find the probability of a conditional event.

3.3   **The Addition Rule**
- a. Determine if events are mutually exclusive.
- b. Use the Addition Rule to find the probability of two events.

3.4   **Additional Topics in Probability and Counting**
- a. How to calculate combinations and permutations.
- b. Apply counting principles to find probabilities.

4.1   **Probability Distributions**
- a. Distinguish between continuous and discrete random variables.
- b. Construct a discrete probability distribution.
- c. Determine if a probability distribution is valid.
- d. Find the mean, variance, and standard deviation of a discrete probability distribution.
- e. Find the expected value of a discrete probability distribution.

4.2   **Binomial Distributions**
- a. Determine if a probability experiment is a binomial experiment.
- b. Find binomial probabilities.
- c. Find the mean, variance and standard deviation of a binomial probability distribution.

4.3   **More Discrete Probability Distributions**
- a. How to find probabilities using the geometric distribution.

5.1   **Introduction to Normal Distributions and the Standard Normal Distribution**
- a. Interpret normal distribution graphs.
- b. Find areas under the standard normal curve.

5.2   **Normal Distributions: Finding Probability**
- a. Find probabilities associated with normal distributions.

5.3   Normal Distributions: Finding Values
   a.   Find values associated with normal distributions.
   b.   Transform z-scores to x values.

5.4   Sampling Distributions and the Central Limit Theorem
   a.   Find and verify sampling distributions.
   b.   Interpret the Central Limit Theorem.
   c.   Find probabilities using the Central Limit Theorem.

5.5   Normal Approximation to Binomial Distributions
   a.   Determine when a normal distribution can approximate a binomial distribution.
   b.   Find the continuity correction.
   c.   Use a normal distribution to approximate binomial probabilities.

6.1   Confidence Intervals for the Mean (σ Known)
   a.   Find a point estimate and margin of error.
   b.   Construct and interpret confidence intervals when σ is known.
   c.   Determine minimum sample size needed for a given margin of error.

6.2   Confidence Intervals for the Mean (σ Unknown)
   a.   Interpret the t-distribution.
   b.   Construct and interpret confidence intervals when σ is unknown.

6.3   Confidence Intervals for Population Proportions
   a.   Find a point estimate and margin of error.
   b.   Construct and interpret confidence intervals.
   c.   Determine minimum sample size needed for a given margin of error.

7.1   Introduction to Hypothesis Testing
   a.   State null and alternative hypotheses.
   b.   Identify Type I and II errors.
   c.   Identify one and two tailed tests.
   d.   Interpret a decision based on statistical test results.

7.2   Hypothesis Testing for the Mean (σ Known)
   a.   Find p-values.
   b.   Find critical values.
   c.   Perform z-tests for the mean.
   d.   Determine whether to reject or fail to reject a hypothesis.

7.3   Hypothesis Testing for the Mean (σ Unknown)
   a.   Find critical values on the t-distribution.
   b.   Perform t-tests for the mean.
   c.   Determine whether to reject or fail to reject a hypothesis.

7.4   Hypothesis Testing for Proportions
   a.   Perform z-tests for the proportion.
   b.   Determine whether to reject or fail to reject a hypothesis.

8.1   Testing the Difference Between Means (Independent Samples with σ_1 and σ_2 Known)
   a.   Determine if samples are independent or dependent.
   b.   Perform two sample z-tests for the difference between means.

8.2   Testing the Difference Between Means (Independent Samples with σ_1 and σ_2 Unknown)
   a.   Perform two sample t-tests for the difference between means.

8.3   Testing the Difference Between Means (Dependent Samples)
   a.   Perform t-tests on difference of paired data.

8.4   Testing the Differences Between Proportions
   a.   Perform two sample z-tests for the difference between proportions.

9.1   Correlation
   a.   Construct a scatterplot.
   b.   Find a correlation coefficient.
   c.   Test the population correlation coefficient.

9.2   Linear Regressions
   a.   Find the equation of a regression line.
   b.   Use regression line to predict values.

9.3   Measures of Regression
   a.   Find the coefficient of determination.
   b.   Find the standard error of estimate.
   c.   Interpret the types of variation about a line.

10.1   Goodness-of-Fit Test
   a.   Use the chi-square distribution to test whether a frequency distribution fits an expected distribution.

10.2   Independence
   a.   Use a contingency table to find expected frequencies.
   b.   Use the chi-square distribution to test whether two variables are independent.

10.4   Analysis of Variance
   a.   Use a one-way analysis of variance to test claims involving three or more means.
   b.   Discuss two-way analysis of variance.

11.1   The Sign Test
   a.   Use sign test to test claims about a population median.