AP STATISTICS COURSE AUDIT

COURSE DESCRIPTION

AP Statistics is a fall semester high school course that is equivalent to a one-semester introductory statistics course at the college level. The course is open to students who have successfully completed Algebra 3/Trigonometry with a B or better. The class meets daily during 90-minute periods.

COURSE DESIGN

INSTRUCTIONAL METHODS

The instructional approach is a mixture of lecture and student-centered discussion and activities. From the onset, students learn that any work must involve analysis of the data and this emphasis begins with the introductory concepts such as "what does the shape of the graphical display tell us" and continues throughout the course to the later concepts of inference. Where possible, example and assignment problems are selected based on their use of real data, thus encouraging students to understand the role of statistics in the decision making process in all aspects of society.

TECHNOLOGY [C5]

Technology is used as a tool to investigate, explore, simulate, and analyze.

- All students have a TI-83+/84 graphing calculator. If necessary, students are provided a calculator by the school. The calculator is used extensively throughout the course during instruction and for individual student work.
- All students have access to Minitab statistical software in the school math lab. Students have occasional assignments in the form of projects that require the use of Minitab.
- Various applets on the Internet are used during instruction.

TEACHING MATERIALS

Primary Text: Starnes, Daren S.; Daniel S. Yates; and David S. Moore. *The Practice of Statistics*. New York: W.H. Freeman and Company, 2012 (4th edition).

The following texts and resources are used to supplement in teaching the course:

- Peck, Roxy, Chris Olsen, and Jay Devore. *Introduction to Statistics & Data Analysis*. Boston, MA: Brooks/Cole, 2012 (4^{th} edition).
- Brase, Charles H. and Corrine P. Brase. *Understandable Statistics Concepts and Methods.* Boston, MA: Brooks/Cole, 2012 (10^{th} edition).
- Texas Instruments TI83+/84 Graphing Calculators
- Hathaway, Viva; Vicki Greenberg; and Ed Moulton. *Fast Track to a 5, Preparing for the AP Statistics Examination*. Boston: Brooks/Cole Cengage Learning, 2012.
- Newspaper articles and magazine articles pertaining to statistics
- Internet websites and Java applets (primary sources listed below)
    - ap-stat listserv
    - Java applets
    - Chance News **http://www.dartmouth.edu/~chance/index.html**
    - The Data and Story Library **http://lib.stat.cmu.edu/DASL/**

- JSE **http://www.amstat.org/publications/jse/information.html**
- Amazing Applications of Probability and Statistics **http://intuitor.com/statistics/index.html**
- NCSSM Statistics Institutes **http://courses.ncssm.edu/math/Stat_Inst/links_to_all_stats_institutes.htm**

- Videos
- Teacher-developed summary notes for each chapter; given to students prior to Chapter test. Notes are created using various sources and supplement the information in the primary textbook.

COURSE OUTLINE

Chapter 1: Exploring Data [C2a, C3, C5]		
Day	**Topic**	**Assignment**
1	Categorical vs. quantitative variables: Discuss differences; conditional distributions practice examples from handout Worksheet 1-1A *Categorical vs. Quantitative Variables;* Bar graphs	Reading assignment: *Statistical Thinking* and TPS p 2-42; complete TPS 1.2, 1.4, 1.6, 1.7, 1.8, 1.10, 1.12, 1.14, 1.22, 1.26, 1.27-1.32
2	Dot plots; 6 characteristics of a data set: develop using activity handout *Hypothetical Exams (shape, center, spread, cluster, gaps, outliers);* discuss importance of shape, center, spread when describing data set; stem plots: leaves, stems, key	TPS complete 1.38, 1.40, 1.42, 1.44, 1.46, 1.48
3	Frequency distributions and histograms: histograms vs. bar graphs, class size, percents; Histograms on graphing calculator **[C5]**	TPS reading 50-69; complete 1.54, 1.56, 1.58, 1.59, 1.60, 1.69-1.74
4	Mean and 5-number summary: describe distributions using mean, trimmed mean, five-number summary, quartiles, range, IQR; interpret mean and median; outliers; numerical summaries on calculator **[C5]** Box plots; five number summary and graphs on graphing calculator; Standard deviation and variance: balance scale explanation, develop formula; interpret standard deviation	TPS; complete 1.80, 1.82, 1.84, 1.88, 1.90, 1.92, 1.94, 1.96, 1.98, 1.104, 1.106-1.110
5	Chapter 1 Review	TPS complete R1.1-R1.10
6	Chapter 1 Test	TPS reading p 84-98
7	Computer outputs: present outputs from Minitab, SAS; compare with graphing calculator outputs **[C5]**	Worksheet with example outputs
	Problem Set Chapter 1 **[C4]**	TPS complete T1.1-T1.15

Chapter 2: Modeling Distributions of Data [C2a, C2c, C5]		
Day	**Topic**	**Assignment**
1	Percentiles; cumulative relative frequency graphs and their interpretations; measuring position: z-scores; transforming data: adding/subtracting or multiplying/dividing with a constant.	TPS reading 99-104, 110-119 TPS complete 2.2, 2.6, 2.10, 2.12, 1.14, 2.16
2	Density curves: sketch and interpret; informally define normal distribution using histograms of ITBS vocabulary scores. Normal distribution; characteristics of normal distribution; Empirical Rule and Chebychev's Rule	TPS reading p 119-129; complete 2.20, 2.22, 2.24, 2.32, 2.33-2.38, 2.42, 2.44, 2.46, 2.48, 2.50, 2.52
3	Normal distribution calculations; formally define z-scores using activity handout *Placement Exam Scores;* Standardized z-scores: introduce using activity *SAT and ACT Scores*; z-scores and percentiles	TPS complete 2.54, 2.56, 2.58, 2.60
4	Further work with z table: use reference handout *Z Scores;* Assessing normality: construct and interpret normal probability plots to assess normality of data set; using calculator to generate normal probability plot	TPS complete 2.64, 2.65, 2.66, 2.68-2.74
5	Review chapter 2	Review handout *Practice Problems for Chapter 2*
6	Test Chapter 2	TPS readings p 142-157
7	Computer Lab - instruction on how to use STAT PROGRAM software for univariate data analysis	Handout: *STAT PROGRAM*
	Problem Set Chapter 2 **[C4]**	TPS complete T2.1-T2.13
2 days	**PROJECT 1 [C3, C4, C5]** (2 days for in-class computer work/report writing)	

Chapter 3: Describing Relationships [C2a, C5]		
Day	**Topic**	**Assignment**
1	Bi-variate data, scatter plots on graphing calculator; analyze strength, form, direction; activity: estimating *r* from graphs **[C5];** Develop correlation coefficient; interpret *r* and properties of *r*; cautions about *r*	TPS reading 164-174; complete 3.2, 3.6, 3.8, 3.12, 3.14, 3.16, 3.18, 3.22, 3.26
2	Least squares regression (meaning of least squares; Java applet); interpretation of slope and *y*-intercept. Discuss extrapolation vs. prediction;	Handout: *Interpreting slope, intercept and r*; TPS readings p 174 -190; complete 3.27-3.32, 3.36, 3.38, 3.40, 3.42, 3.44, 3.46, 3.48, 3.54
3	Residuals - find and plot with interpretation in reference to appropriateness of linear regression model; standard deviation of the residuals; discuss effects of outliers and influential points (Java applet);r squared and interpretation in context of LSRL	TPS complete 3.50, 3.56, 3.58-3.61, 3.64, 3.66, 3.68, 3.69-3.78
4	Bivariate data computer display interpretations **[C5]**	AP Free Response questions involving concepts of this chapter
5	Review Chapter 3	TPS complete R3.1-R3.7
6	Test Chapter 3	TPS readings p 206 - 225
	Problem Set Chapter 3 **[C4]**	TPS complete T3.1-T3.13
2 days	**PROJECT 2 [C3, C4, C5]** (2 days for in-class computer work/report writing)	

Chapter 4: Designing Studies [C2b, C2c]		
Day	**Topic**	**Assignment**
1	Basic principles of sample designs: population vs. sample; sample survey. Sampling badly: convenience sample; bias; voluntary response sample. Sampling well: random, simple random, how to choose an SRS. Other types of samples: stratified random, cluster. Sampling errors: undercoverage, nonresponse, bias, wording errors, census. Cartoon Survey Activity.	TPS reading p 231-242; complete 4.2, 4.4, 4.6, 4.8, 4.10, 4.12, 4.18, 4.20, 4.22, 4.24, 4.26-4.29, 4.32, 4.36
2	Observational study vs. experiment; lurking variables, confounding. Basic properties of experimental design; subjects, factors, experimental units, treatments, variables, placebo effect. Three principles of experimental design: control, randomization, replication.	TPS reading p 242-252; complete 4.37-4.42, 4.46, 4.48, 4.50, 4.52, 4.54, 4.58, 4.64, 4.66, 4.68
3	Inference for experiments, statistically significant. Blocking for control, matched pairs. Random digit generating (table and calculator); simulate an experiment using Cumulative AP Practice Test 1 AP1.16 **[C5]**	TPS reading p 261-268; complete 4.70, 4.72, 4.74, 4.76, 4.78, 4.80, 4.82, 4.86
4	Further look at studies; scope of inference; types of conclusions, critiquing studies. Activity: *Response Bias*.	TPS complete 4.91-4.98, 4.102-4.108, 4.55, 4.84
5	Chapter 4 Review	TPS complete R4.1-R4.12
6	Chapter 4 Test	TPS readings p 282-293, 299-308
	Problem Set Chapter 4 **[C4]**	TPS complete T4.1-T4.13
1 day	**PROJECT 3 [C3, C4]** (1 day for in-class work/report writing)	

Chapter 5: Probability: What Are the Chances? [C2c, C4, C5]		
Day	**Topic**	**Assignment**
1	Theoretical vs. empirical probability; Law of Large Numbers; properties of probability; tables; Venn diagrams; performing simulations. Basic probability; probability model; random chance; simple event; sample space; complement; mutually exclusive/disjoint; basic counting principle.	TPS reading p 312-328; complete 5.2, 5.4, 5.8, 5.10, 5.12, 5.16, 5.20, 5.24, 5.28, 5.32-5.36, 5.44, 5.48, 5.52, 5.56
2	Addition rules; conditional probability using two-way table. Conditional probability-tables, trees, formula. Multiplication rules; independent events	TPS complete 5.57-5.60, 5.64, 5.66, 5.68, 5.70, 5.74, 5.80, 5.84, 5.88, 5.92, 5.96, 5.98, 5.100
3	*Review:* Worksheet Practice Problems Chapter 5 in groups	Review Worksheet TPS complete R5.1-R5.11
4	Review - student presentations of solutions to previous day's work **[C4]**	Handout *Practice Problems on Probability*
5	Chapter 5 Test	TPS reading p 340-352
	Problem Set Chapter 5 **[C4]**	TPS complete T5.1-T5.14

Chapter 6: Random Variables [C2c, C5]		
Day	**Topic**	**Assignment**
1	Intro probability distributions; discrete random variables; properties of discrete probability distributions; mean (expected value) and standard deviation of a discrete random variable; continuous random variables	TPS reading p 358-377; complete 6.2, 6.6, 6.8, 6.9, 6.13, 6.14, 6.18, 6.20, 6.24, 6.26
2	Linear transformations on random variables; combining random variable-effects of; independent random variables	TPS complete 6.27-6.30, 6.38, 6.40, 6.44, 6.46
3	Rules for mean and variance; combining independent random variables; Expected value problems *Practice Problems-Ch 6* worksheet	TPS reading p 382-402; complete 6.50, 6.52, 6.57-6.60, 6.64
4	Binomial setting; binomial random variables; binomial probabilities; mean and standard deviation of a binomial distribution; binomial distributions in statistical sampling; geometric random variables; binomial vs. geometric comparison.	TPS complete 6.62, 6.65, 6.66, 6.70, 6.72, 6.74, 6.76, 6.78, 6.80, 6.84, 6.88, 6.90
5	Binomial and geometric distribution with simulations on graphing calculator **[C5]** AP Questions on probabilities and probability distributions - in class group work **[C4]**	TPS complete 6.94, 6.96, 6.98, 6.100-6.103 Teacher made packet of AP Questions
6	Chapter 6 Review	TPS complete R6.1-R6.8
7	Chapter 6 Test	TPS reading p 413-428
	Problem Set Chapter 6 **[C4]**	TPS complete T6.1-T6.14
8	Midterm Review	All problem sets
9	Midterm Review	All problem sets
10 and 11	**MIDTERM EXAM**	

Chapter 7: Sampling Distributions [C2c, C2d, C5]		
Day	**Topic**	**Assignment**
1	Activity - random sample generated from graphing calculator - find mean of 1- 100; introduce sampling distributions. Characteristics of sampling distributions	TPS reading p 432-439, 442-454; complete 7.2, 7.4, 7.6, 7.8, 7.10, 7.12, 7.14, 7.17-7.20
2	Sampling distributions of sample proportions; mean, standard deviation, normal approximation and conditions. Central Limit Theorem (Java applet) **[C5]** Sampling distributions of sample means: mean, standard deviation, conditions	TPS complete 7.21-7.24, 7.28, 7.30, 7.34, 7.38, 7.42-7.46, 7.50, 7.52, 7.54, 7.56, 7.58, 7.60, 7.62, 7.64-7.68
3	Chapter 7 Review	TPS complete R7.1-R7.7
4	Chapter 7 Test	TPS readings p 467-480
	Problem Set 7 **[C4]**	TPS complete T7.1-T7.13

Chapter 8: Estimating with Confidence [C2c, C2d, C4, C5]		
Day	**Topic**	**Assignment**
1	Intro confidence intervals – interpreting confidence levels; meaning of confidence interval. Confidence Interval (Java applet) **[C5]** Conditions for constructing a confidence interval; how to find margin of error, critical *z*-value from table. Confidence intervals: choosing level of confidence and its effects on ME; choosing sample size; calculator methods; graphing calculator outputs **[C5]**	TPS readings p 484-495; complete 8.6, 8.8, 8.10, 8.14, 8.18-8.24, 8.28, 8.32, 8.34
2	Conditions for estimating p; how to find standard error. Confidence intervals: choosing level of confidence and its effects on ME; choosing sample size; calculator methods; graphing calculator outputs **[C5]**	TPS readings p 499-517; complete 8.36, 8.38, 8.42, 8.44, 8.48 AP Free Response Questions
3	One sample *z* interval for a population mean; choosing sample size. Introduce *t* distribution; degrees of freedom; how to read Table to determine P-value; calculator methods **[C5]**	TPS complete 8.49-8.52, 8.56, 8.58, 8.60, 8.64, 8.66, 8.68, 8.72, 8.74-8.78 AP Free Response Questions
4	Chapter 8 Review	Handout *Review Exercises Chapter 8*
5	Chapter 8 Test	TPS readings p 527-537
	Problem Set Chapter 8 **[C4]**	TPS complete T8.1-T8.13

Chapter 9: Testing a Claim [C2c, C2d, C4, C5]		
Day	**Topic**	**Assignment**
1	Intro to significant tests: meaning of statistical significance, stating hypotheses, test statistics, interpreting *P*-values, drawing conclusions, meaning of alpha and relation to critical region determined by *z**	TPS reading p 538-545; complete 9.2, 9.4, 9.6, 9.8, 9.10, 9.12, 9.14
2	Type I and Type II errors: teacher developed handout *ERRORS IN HYPOTHESIS TESTING* Power: meaning of Power; what can effect Power of test and how; Java applets to show effects of changes of alpha and beta **[C5]**	TPS reading p 549-561; complete 9.27-9.30, 9.42, 9.44, 9.46, 9.48, 9.50, 9.52, 9.56 Handout: *ERRORS IN HYPOTHESIS TESTING* AP Free Response Questions
3	Significance test for one sample proportion, test statistic, the four step process, two-sided tests, importance of confidence intervals, calculator methods **[C5]**	TPS reading p 565-587; complete 9.57-9.60, 9.72, 9.74 AP Free Response Questions
4	Significance tests for a population mean: one-sample *t* test, two-sided tests and confidence intervals, matched pairs *t* - construct and interpret *t* interval, robust procedures, using tests wisely, calculator methods **[C5]**	TPS complete 9.76, 9.78, 9.90, 9.94-9.97, 9.99-9.104 AP Free Response Questions
5	Cumulative review of statistical inference - in class group work	Inference worksheets
6	Chapter 9 Review	TPS complete R9.1-R9.9
7	Chapter 9 Test	TPS reading p 601-620
	Problem Set 9 **[C4]**	TPS complete T9.1-T9.13

Chapter 10: Comparing Two Populations or Groups [C2c, C2d, C4, C5]		
Day	**Topic**	**Assignment**
1	Comparing 2 proportions: teacher developed notes; sampling distribution of; confidence intervals; using two sample values; significance tests with two samples; when to use pooled proportion; writing hypotheses for two-samples, cautions; calculator procedures **[C5]**	TPS reading p 627-651; complete 10.2, 10.4, 10.6, 10.8, 10.12, 10.16, 10.18, 10.22, 10.24
2	Comparing 2 means: teacher developed notes; sampling distribution of the difference between 2 means; two-sample *t* statistic; finding the standard error; confidence intervals; significance tests; calculator procedures **[C5]**	TPS complete 10.29-10.32, 10.36, 10.40, 10.42, 10.46, 10.52, 10.54, 10.58, 10.60, 10.66, 10.67-10.70
3	Review statistical inference - in class group work	AP Free Response Questions and multiple choice questions
4	Review statistical inference-in class group work	AP Free Response Questions
4	Chapter 10 Review	TPS complete R10.1-R10.10
5	Chapter 10 Test	TPS reading p 675-691
	Problem Set Chapter 10 **[C3, C4]**	TPS complete T10.1-T10.13
1 day	**PROJECT 4 [C3, C4]** (1 day for in-class work/report writing)	

Chapter 11: Inference for Distributions of Categorical Data [C2c, C2d, C4, C5]		
Day	**Topic**	**Assignment**
1	The Candy Man Activity; Chi Square Distribution: Intro Chi-Square distribution; chi-square statistic; goodness of fit using activity; how to read chi-squared distribution table; calculator methods **[C5]**	TPS reading 696-724; complete 11.2, 11.4, 11.6, 11.8, 11.10, 11.12, 11.18
2	Finding expected counts; Inference using chi square - test for homogeneity; multiple distributions; test for independence; difference between homogeneity and independence; calculator methods with matrices **[C5]**	TPS complete 11.19-11.22, 11.28, 11.32, 11.34, 11.36, 11.44
3	Chi squared inference tests - review; computer printouts for chi-squared tests **[C5]**	TPS complete 11.46, 11.50, 11.52-11.58 AP Free Response Questions
4	Chapter 11 Review	TPS complete R11.1-R11.6
5	Chapter 11 Test	TPS reading p 737- 758
	Problem Set 11 **[C4]**	TPS complete T11.1-T11.13

Chapter 12: More about Regression [C2c, C2d, C4, C5]		
Day	**Topic**	**Assignment**
1	Review regression; sampling distribution of *b;* conditions for regression inference; difference between population and sample regression lines; estimating the parameters; Slope and confidence intervals; inference on slope; calculator methods **[C5]**	TPS reading 765-785; complete 12.2, 12.4, 12.6, 12.8, 12.10, 12.12, 12.14, 12.16, 12.18, 12.20
2	Intro non-linear data transformations; logarithm review; Power Models - log-transformations to linearize and model data; determine best model for data	TPS complete 12.21-12.26, 12.34, 12.36; AP Free Response #6 1997
3	Exponential Models - common ratio; log-transformation to linearize and model data; calculator entries and computer displays **[C5]** Other transformations;	TPS complete 12.38, 12.40, 12.42, 12.45-12.48
4	Review - in class group work; computer outputs **[C5]**	TPS complete R12.1-R12.6
5	Chapter 12 Test	
	Problem Set Chapter 12 **[C4]**	TPS complete T12.1-T12.12
6-9	Final Project (4 days of in-class work)	
10	Final Exam Review	
11	Final Exam Review	
12	**Final Exam**	

AP Examination Review- Completed after school in April	
	Chapter Review Problems
	Practice Multiple Choice
	Practice Free Response
	Grading and Test Taking Strategies

ASSIGNMENTS AND ASSESSMENTS

Graded assessments account for 90% of the trimester grades. There are three trimesters in the full semester course.

Tests

All tests include a minimum of ten multiple-choice questions and two to four free-response problems. Free-response problems often incorporate multiple procedures. Students are provided a copy of the formulas given in the AP Statistics exam. No other notes are allowed during testing. The use of a graphing calculator is required.

Midterm and Final Exams

The course requires a Midterm Exam. Some students are exempt from the Final Exam based on their course grades. The exams are written to follow the AP exam format with 40 multiple choice questions and several free-response questions.

Problem Sets [C3, C4]

At the end of every chapter, students are given a set of problems to complete. The problems provide the opportunity for students to demonstrate their ability to bring together the major concepts learned in that chapter and concepts from prior chapters. The problems are more difficult or time consuming in terms of the work needed to solve the problems than those normally included in the Chapter Tests. The students have at least one week to complete the problems. At the top of each Problem Set is a warning to the students to work alone and that the work should reflect their own thinking and understanding. The Problem Sets each count as a test grade.

Projects [C3, C4]

The projects are assigned prior to the AP Exam. Some in-class time is allotted for computer work and writing of the project reports but the bulk of the time spent on the projects is done after school.

Project 1: Students are randomly assigned a set of quantitative data, a different set for each student. The data sets are from various sources found and provided by the teacher. Students use computer software to generate two different graphs and provide numerical summaries. The report includes an analysis of the effectiveness of each graph in presenting a visual picture of the key features of the data and the most appropriate measures of center and spread to describe the data. Use of correct terminology is included in the assessment.

Project 2: Students use computer software to analyze three different data sets (Special Problem 3A from TPS Yellow Binder), compute the correlation coefficients, and in each case plot the scatterplot, residual plot and the least-squares regression line. Students will compare results to demonstrate the need to look at the graphs of data to avoid making false conclusions from using only statistics. The report includes the following additional work: Data Set A - 3 calculations using the LSRL to illustrate making predictions and explain the dangers of extrapolation; Data Set B - propose and find an appropriate non-linear model; Data Set C - identify the influential observation and explain its effect. Project 2 is the only project that does not provide for individual student work. Since the bulk of the computer work for this project is done during class time, the integrity of the project is not greatly compromised by students sharing work. Students are warned to work alone and that the work should reflect their own thinking and understanding.

Project 3: Students design an experiment and a survey of their choice. The report contains the following: Experiment - question trying to answer (example: can you tell the difference between bottled and tap water), how units/subjects are chosen, detailed description of how the experiment will be conducted (treatment, random assignment, placebo, blocking, how results will be tabulated/compared and reported), discussion of possible sources of error and how will their effects be reduced if possible; Survey - two different wordings of the same question and analysis of how the wording may influence response, how subjects will be chosen, how the survey will be conducted (face-to-face, ballot, etc), discussion of possible sources of error and their effects and what could be done to reduce their effects, how the results will be tabulated and reported. (Students will not conduct the studies at this time but will select one of the studies for the final project.)

Project 4: The students will find a previously reported statistical study done by an outside source. This may come from an article in the newspaper, a magazine, or found on the Internet. They will report on what the study involved, how it was conducted, what statistical tests were done, and whether there are any suspicious statements being made in the report. **(The students' assignment and the scoring rubric for this assignment are presented below.)**

Final Project: The students will work in pairs or individually to conduct a study on a topic of their choice as proposed in Project 3. Any faults with their work in Project 3 must be corrected. The project requires both a written report and oral presentation of their work. Minitab will be used to analyze the data. The report will have a formal format indicative of a true research report. It will contain each of the following components: abstract overview of the study, the question the student is trying to answer, a careful description of how the samples are obtained (including sample size and the sampling process), the actual data, summary statistics, graphical displays, appropriate statistical analyses, conclusions, description of any weaknesses in the study, possible ways to alleviate weaknesses in the future and ideas for further research. The students will do an oral presentation of their study to the class. The oral presentation must include some visual aids such as posters, transparencies, or power point.

Project 4 – Research Article

General Description
The project will draw on much of what you have learned in this class. You will find a previously reported statistical study done by an outside source. This may come from an article in the newspaper, a magazine, or found on the Internet. You are to write a short paper and present the information to your classmates.

Research Article
1. You will read a news article (not just a chart or graph) concerning a statistical study.
2. Approval of the article must be done by . Duplicate articles are not allowed!
3. The actual article (no photocopies) must be submitted with your report.
4. The source of the article must be identifiable on the submitted article (the name of the newspaper and/or magazine with date, the web source, etc)

What constitutes a good article:
The article should include concepts we have discussed in class. Pick an article with substance; that is, it makes strong statistical references and is not just a "general" discussion. Some questions to consider that the article answers are:
1. How was the data collected?
2. Why was the data collected?
3. What does the data imply?
4. What statistical tests were done? (Required)
5. Are there any suspicious statements being made? (Cite or explain the part of the article that makes you suspicious.)

Requirements of the Paper:
The paper will consist of a summary of the study as well as your personal conclusions. The goal is to enlighten the reader of your paper with words, numbers and/or pictures. Use the following format.
1. The paper should be at least one page and no more than 2 pages long. Any charts or tables can be included but are not counted as part of the 2 pages.
2. It should be grammatically correct and have no spelling errors and be neatly done.
3. Use double space, Times New Roman or Palatino 12-point font, one-inch margins for entire paper.
4. Cover Page (title of article, your name, date)
5. Elements of Your Report
    - Introduction (state topic of the article, goals of the study, explain whether observational or experiment and your reason for this decision). This should be one paragraph long. Details of the study will be presented in your Summary of Research Study.
    - Summary of Research Study (general description of how the data was collected, the statistics presented in the article, the conclusions reported in the article, anything else you find interesting) (The summary can be more than one paragraph.)
    - Your Conclusion (was it a valid study, any biases you noted (lurking variables, errors, etc), agreements/disagreements with conclusions, etc. This will be your time to shine and show all you learned in this course so far.)
6. Attach the article to your report.

All of the above components will be included in the grading of your report. Don't make things up to cover yourself! Show statistical insight!!!

Grading:
Your written report is due on . It will count as a test grade using the 4-point rubric below. **No** late work will be accepted. Your project report will be graded based on multiple criteria as indicted in the rubric. Date of completion – if you are absent from class/school on your report must still be in school that day. There will be a one-letter grade reduction for every day the report is late.

The total points will be assigned as follows:
Organization, neatness, cover page

4 The report is clearly organized in its presentation and discussion transitions flow naturally. It is neat in appearance and has the required components on a cover page.
3 There are minor flaws in one of the following: organization, appearance, cover page
2 There are major flaws in one of the following: organization, appearance, cover page. Or, there are two minor flaws.
1 There are major flaws in organization and appearance but cover page is acceptable.
0 There are major flaws in organization and appearance and no cover page.

Grammar, punctuation, spelling

4 The following are correct: grammar, punctuation, and spelling.
3 There are minor errors in one of the following: grammar, punctuation, and spelling.
2 There are major errors in one of the following: grammar, punctuation, and spelling.
1 There are major errors in two of the following: grammar, punctuation, and spelling.
0 There are major errors throughout in the following: grammar, punctuation, spelling.

Documentation of Source

4 A research article was selected that meets the objectives of the project. Although the student may not have access to the actual data and full details of the study, the research article must provide enough information for the student to support or question the results of the study. The article was appropriately referenced and a copy provided.
3 A research article was selected that meets the objectives of the project. Either the source of the article was not appropriately referenced or a copy was not provided.
2 The research article is slightly inappropriate. The article was appropriately referenced and a copy provided.
1 The research article is inappropriate. The article was appropriately referenced and a copy provided.
0 No source documentation and copy provided.

Introduction

4 The student thoroughly describes the main topic of the study and its goals. The description provides a clear statement of the topic of the article, the goals of the study, and states whether the study was an observation or an experiment with an explanation for the student's choice.

3 The student describes a main topic of the study and its goals. The description indicates the student does not have a clear understanding of either the main idea of the study or the goals of the study. The student correctly determines if the study was observational or an experiment with a correct explanation.

2 The student describes the main topic of the study and its goals. The description indicates the student has a clear understanding of the main idea of the study and the goals of the study. The student incorrectly determines if the study was observational or an experiment but provides an explanation that indicates the student knows the difference between the two types of studies.

1 The student describes the main topic of the study and its goals. The description indicates the student has a clear understanding of the main idea of the study and the goals of the study. The student incorrectly determines if the study was an observation or an experiment; the explanation demonstrates the student's lack of understanding of the difference between these two types of studies

0 The student describes a main topic of the study and its goals. The description indicates the student does not have a clear understanding of either the main idea of the study or the goals of the study. The student incorrectly determines if the study was an observation or an experiment; the explanation demonstrates the student's lack of understanding of the difference between these two types of studies.

Summary of Research Article

4 The student thoroughly describes the research presented in the article. The description includes the following areas of discussion: what was studied, how the study was conducted, the statistical techniques used, and the reported conclusions of the study. The terminology used is correct.

3 The student describes the research presented in the article. The summary has areas of discussion that are somewhat vague. The terminology used is correct.

2 The student attempts to describe the research presented in the article. The description includes errors in no more than two of the discussion areas or there is one area of discussion omitted. Minor terminology errors are present.

1 The student omitted at least two key areas in the summary.

0 The student made major errors in interpreting the statistical techniques reported in the article.

Conclusion

4 The student presents a thorough and accurate argument on the validity of the study based on the information provided in the article, indicates potential sources of bias/errors, and provides a valid argument for agreement/disagreement with the conclusions of the study.

3 The student provides a thorough and accurate argument on the validity of the study based on the information provided in the article and provides a valid argument for agreement/disagreement with the conclusions of the study. Areas of potential bias/errors are vaguely mentioned.

2 The student provides a thorough and accurate argument on the validity of the study based on the information provided in the article and provides a valid argument for agreement/disagreement with the conclusions of the study. A key potential source of bias is completely omitted in the argument.

1 The student provides vague or inappropriate arguments in all areas of the conclusion.

0 The student simply states agreement or disagreement with the study's conclusion without providing an explanation.

The following point totals will be used to determine the project grade:

24 – 23	A+	12 – 10	C
22 – 20	A	9 – 8	D+
19 – 18	B+	7 – 6	D
17 – 15	B	< 6	F
14 – 13	C+		

CURRICULAR REQUIREMENTS (as referenced in the syllabus above)

C2 The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on each:
- Exploring Data
- Sampling and Experimentation
- Anticipating Patterns
- Statistical Inferences

C3 The course draws connections between all aspects of the statistical process, including design, analysis, and conclusions.

C4 The course teaches students how to communicate methods, results, and interpretations using the vocabulary of statistics.

C5 The course teaches students how to use graphing calculators and demonstrates the use of computers and/or compute output to enhance the development of statistical understanding through exploration and analysis of data, assessment of models, and simulations.