

Program Cover Document --- STA 115: Statistics

I. Basic Course Information

An introduction to descriptive statistics and statistical inference. STA 115 is worth one course unit that has two 80 minute meeting times each week. This course is intended for students who do not plan to take advanced statistics-based courses. Emphasis is placed on interpretation of results and their real world consequences rather than calculation. STA 115 cannot be taken if STA 215 has already been successfully taken.

II. Learning Goals

This course introduces the students to statistical ideas and concepts with an emphasis on the interpretation of data and the communication of statistical results. Topics include sampling, surveys, experimental designs, observational studies, data exploration, chance phenomena, and methods of statistical inference.

On completion of the course, students will be able to:

- I. Recognize and apply the most appropriate probability sampling techniques in order to collect data from a population.
- II. Understand the basic principles of statistical design of experiments and critically evaluate claims based on statistical reasoning from survey and experimental results.
- III. Interpret and communicate statistical reasoning using basic statistical terms, descriptive statistics, and charts and graphs.
- IV. Recognize and evaluate the relationship between two quantitative variables through simple linear regression and correlation and be able to explain why correlation does not imply causation.
- V. Analyze and interpret relationships in two-way tables.
- VI. Understand the relationship between sample statistics and population parameters, determine appropriate point and confidence interval estimates of selected population parameters and interpret the estimates.
- VII. Describe basic principles of probability, including the application of the normal curve to social and physical phenomena.
- VIII. Understand the concept of statistical significance, including that it does not always imply practical significance.
- IX. Understand the concept of a hypothesis test and be able to describe the hypotheses, select the appropriate statistical test, determine the observed significance level (p-value), interpret the results, and draw appropriate conclusions.

III. Student Assessment

Students will receive regular feedback on their work through the assignment of homework, quizzes, student presentations and examinations. A common final exam will be used for this

course. Through this feedback, students will be able to see and correct their misunderstandings and improve their performance. Student performance on these assessment instruments will be used to assess the success of STA 115 in achieving its learning goals and its contribution to the fulfillment of the goals of each student's program of study. Peer reviews and student evaluations will also be used to evaluate the course.

IV. Learning Activities

Learning activities will consist of lectures, projects, in-class group discussions and problem solving, online homework through Achieve, additional homework assignments utilizing spreadsheet software such as Excel or Google Sheets, group projects, and student presentations. The instructor has discretion in choosing the combination of methods they feel will be most effective, but are encouraged to employ active learning practices. Projects that have been successful in this class include 1) designing, conducting, and analyzing a survey of TCNJ students or 2) finding and critiquing statistical statements in the popular media and presenting these to their classmates.

STA 115: Statistics Course Syllabus

PROFESSOR:

OFFICE:

EMAIL ADDRESS:

OFFICE HOURS:

PRIMARY MEANS OF COMMUNICATION:

EXPECTED RESPONSE TIME:

Course Description:

An introduction to descriptive statistics and statistical inference. STA 115 is worth one course unit that has two 80 minute meeting times each week. This course is intended for students who do not plan to take advanced statistics-based courses. Emphasis is placed on interpretation of results and their real world consequences rather than calculation. STA 115 cannot be taken if STA 215 has already been successfully taken.

Course Design:

STA115 is designed as an introduction to statistical concepts with a minimal amount of work expected in mathematical calculation. Instructors should pay particular attention to the presentation level in the textbook and not try to exceed the mathematical calculations presented there. Students are expected to focus on concepts, especially the presentation of data, statistical summaries, use of confidence intervals, and the use and misuse of statistical tests. Under no circumstances should students be expected to calculate any statistic by hand unless taught in the textbook. Students may be introduced to more complex calculations as part of the lectures and presentations, but it should not form part of their homework or exams.

Course Materials:

The required resource for this class is Achieve, which is being provided through the First Day program with the bookstore. With First Day, the publisher agrees to sell the access at a discounted rate, lower than the regular retail price. That charge is added to your term bill, so you're still able to use financial aid to pay for the course materials. You do have the ability to opt out of that charge, but doing so will mean you're responsible for obtaining Achieve access for *Statistics: Concepts and Controversies, 10th ed.* ISBN: 9781319395056, on your own, which will cost more. That access can be purchased from:

<https://store.macmillanlearning.com/us/product/Statistics-Concepts-and-Controversies/p/1319109020>.

You'll access Achieve, which includes the eBook and required homework assignments, through our course page in Canvas and grades completed work will periodically (not immediately) sync to Canvas.

Students will also be expected to have a scientific, non-graphing calculator, as recommended by

the instructor.

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On completion of the course, students will be able to:

- A. Recognize and apply the most appropriate probability sampling techniques in order to collect data from a population.
- B. Understand the basic principles of statistical design of experiments and critically evaluate claims based on statistical reasoning from survey and experimental results.
- C. Interpret and communicate statistical reasoning using basic statistical terms, descriptive statistics, and charts and graphs.
- D. Recognize and evaluate the relationship between two quantitative variables through simple linear regression and correlation and be able to explain why correlation does not imply causation.
- E. Analyze and interpret relationships in two-way tables.
- F. Understand the relationship between sample statistics and population parameters, determine appropriate point and confidence interval estimates of selected population parameters and interpret the estimates.
- G. Describe basic principles of probability, including the application of the normal curve to social and physical phenomena.
- H. Understand the concept of statistical significance, including that it does not always imply practical significance.
- I. Understand the concept of a hypothesis test and be able to describe the hypotheses, select the appropriate statistical test, determine the observed significance level (p-value), interpret the results, and draw appropriate conclusions.

Learning Activities:

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successful in this class include 1) designing, conducting, and analyzing a survey of TCNJ students or 2) finding and critiquing statistical statements in the popular press and presenting these to their classmates.

Grading and Exams:

A significant quiz or exam must be completed by the end of the fifth week, a full exam by the end of the seventh week, and an additional significant quiz or exam by the eleventh week. The specific weights of categories are left up to the instructor, but the following guidelines are preferred:

Two – Three In Class Exams:	25 – 50%
Homework Assignments:	10 – 20%
Projects (Optional):	0 – 30%
Short Quizzes (Optional):	10 – 20%

This course will have a final exam worth 25% of the final grade.

Fourth Hour:

In this class, the deep learning outcomes associated with TCNJ's 4th hour are accomplished by a series of rigorous educational assignments and projects that extend beyond the typical scheduled class time. These include learning to use statistical analysis tools in Excel and group work on projects during the semester. In addition, it is expected that many students will require additional time with tutors during the semester to develop the skills needed to apply the statistical concepts learned. The course is expected to meet for the full time each class period and to the end of the semester.

Attendance:

All students are expected to attend all classes and are responsible for all information provided. A student who is absent for a test will not be permitted to make up the test unless prior arrangements with the instructor have been made. Approval for missing a test will only be permitted in exceptional circumstances. In the case of illness, a doctor's note will be required. Please view TCNJ's attendance policy at

<https://tcnj.policystat.com/policy/14878285/latest/>

Academic Honesty:

Please make sure you are familiar with TCNJ's academic integrity policy. Any suspected violation of this policy will be confronted in the strict accordance with the policy:

<https://tcnj.policystat.com/policy/14878597/latest/>

Americans with Disability Act Policy:

<https://tcnj.policystat.com/policy/14879690/latest/>

Final Exam-Evaluation-Reading Days Policy:

Exams in the last week of class are limited to 15% of the total grade and the graded exams must be returned to the students by the first day of reading period to allow students to learn from any

mistakes. The final exam must take place during the exam period, and students must be permitted to use the full 170 minutes of allotted exam time. The final exam should count for no more than 35% of the final grade.

<https://tcnj.policystat.com/policy/12675908/latest/>

Commitment to Diversity, Equity, inclusion, Access, and Belonging:

The TCNJ community is composed of people with diverse backgrounds, perspectives, and experiences, and the college is committed to diversity, equity, inclusion, access and belonging. The college's Campus Diversity Statement can be viewed here: <https://diversity.tcnj.edu/campus-diversity-statement/>

Classroom Environment and Commitment to Student Success, Safety, and Well-Being:

The TCNJ community is dedicated to the success, safety and well-being of each student. TCNJ strictly follows key policies that govern all TCNJ community members rights and responsibilities in and out of the classroom. In addition, TCNJ has established several student support offices that can provide the support and resources to help students achieve their personal and professional goals and to promote health and well-being. You can find more information about these policies and resources at the "TCNJ Student Support Resources and Classroom Policies" webpage here: <https://academicaffairs.tcnj.edu/tcnj-syllabus-resources/>. Students who anticipate and/or experience barriers in this course are encouraged to contact the instructor as early in the semester as possible. The Accessibility Resource Center (ARC) is available to facilitate the removal of barriers and to ensure reasonable accommodations. For more information about ARC, please visit: <https://arc.tcnj.edu/>

Suggested Schedule:

A suggested schedule is presented here. Chapters 9 and 16 can be considered optional.

Date	Section covered	Topics Covered	Date	Section covered	Topics Covered
1/23	1		3/15	SPRING BREAK NO CLASS	
1/26	2		3/19	15	
1/30	3		3/22	Exam 2	10-14
2/2	4		3/26	17	
2/6	5		3/29	18	
2/9	6		4/2	19	
2/13	7,8		4/5	20	
2/16	10,11		4/9	21	

2/20	12		4/12	22	
2/23	Exam 1	1-8	4/16	22	
2/27	12		4/19	Exam 3	15-22
3/1	13		4/23	23	
3/5	13		4/26	24	
3/8	14		COSA NO 4/30 CLASS		
3/12	SPRING BREAK NO CLASS		5/3	Presentations	

Please note that this document is subject to change. Changes made will be infrequent and within reason and students will be notified promptly if they do occur.