

# Broward College

## STA2023 – Statistics

Instructor:	Carlos Sotuyo	Term/Session:	Summer 2019, session 3
Instructor's BC E-mail:	csotuyo@broward.edu	Reference No.	619218
Office Hours:	1:50 pm - 2:50 pm	Class Days:	Tues-Thurs
Office:	Bldng 69, Room 255A	Class Time:	6:00 pm to 9:50 pm
Math Department Phone Number:	(954) 201-8920 (954) 201-8975 (FAX)	Classroom:	Building 70, room 107
Emergency Phone Number:	(954) 201-4357 (Safety) (954) 201-4900 (Hotline)	Withdrawal Date:	Last day drop 100% refund: 07/3/2019 Withdrawal with W: 07/19/2019

**No classes:** July 4, Independence Day.

Last Day To Drop Class With 100% Refund (Summer Term Session 3): July 3. Last day withdraw with W: 07/19

### COURSE DESCRIPTION:

A first course in statistical methods including such topics as collecting, grouping, and presenting data; measures of central tendency, position, and variation; theoretical distributions; probability; test of hypotheses; estimation of parameters; and correlation. Use of statistical computer software and/or a scientific calculator (capable of performing 2-variable statistics) will be required.

### GENERAL OUTCOMES:

Upon completion of this course, students will be able to:

- Organize, summarize, and illustrate data both in table and in graph form, as well as be able to interpret the meanings of such tables and graphs.
- Calculate measures of location, central tendency and dispersion, and distinguish between population parameters and sample statistics.
- Apply the definitions and rules of probability to solve problems involving discrete variables.
- Determine the probability distribution for a given experiment and random variable, and calculate its mean and standard deviation.
- Solve problems using normal distributions and apply the Central Limit Theorem for sample means.
- Demonstrate an understanding of the concepts and structure of hypothesis testing and by performing hypothesis tests in various situations.
- Apply the hypothesis testing concepts to a wide variety of different situations.
- Determine point and interval estimates for population parameters and to determine sample sizes for the estimation of parameters.
- Calculate the correlation coefficient, determine if there is a significant linear correlation, and find the line of best fit.

### PREREQUISITE:

Recommendation of the Mathematics Department or at least a grade of C in the prerequisite course (MAT1033 or STA1001) is required.

### TEXTBOOK:

Essentials of Statistics, 6<sup>th</sup> Edition by Mario F. Triola, Pearson.

### SUPPLEMENTAL MATERIAL:

A **Scientific Calculator** or **Graphing Calculator** is required in each lecture. Formula and charts attached in your textbook. A Graphing Calculator, TI 83, TI 84 or Casio fx-9750 is **strongly recommended**.

**HOMEWORK:**

MyStatLab (MSL) is the homework component and is worth 200 points. MyStatLab Access Code is required. E-book is included with the purchase of MSL. <http://mystatlab.com>. Registration for mymathlab ends February 2<sup>nd</sup>. MyStatLab: **User Name:** Student ID, **Password:** broward. This is a generic password that you may change it later. You will have access to the class immediately and be prompted to enter your access code. You may choose the 14 days temporary free access if you are not ready to purchase the code immediately. After the 14 days period expired, an access code must be required. **Instructor’s course ID:** sotuyo71774.

**Statdisk** is an educational statistical software created by Mario Triola (Textbook’s author). Downloadable for free at <https://www.statdisk.org/>. At least three (3) extra credits assignments, 10 points each, will be suggested by the instructor (those points will be added to the corresponding exam).

**ASSISTANCE:**

**Academic Success Center (ASC):**

The ASC centers at Broward College are here to ensure your success in this class. You will benefit from an array of academic support services provided in a comfortable, collaborative atmosphere specifically designed to advance your academic achievement: <http://www.broward.edu/studentresources/lrc/Pages/default.aspx>

Here are just some of the services provided at the ASC:

- Academic Support Labs (Science Center, Math Lab, Writing Center)
- Collaborative Project Space
- Graphing Calculators
- Open Computer Centers (Printing)
- Study Groups
- Textbook Reserves
- Tutoring by Certified Tutors (All subject areas)

**Seahawk Support Program:**

The Seahawk Support Program is a coordination between students, faculty, the Office of Student Success, and the ASC designed to support students in order to increase their chances of success. If you are contacted by a representative of the Office of Student Success or the ASC, please take full advantage of this excellent opportunity to improve your success in this course.

**CELL PHONE POLICY:**

Put your cell phone away on “silent-mode”. Cell phones, smart phones, IPod, and other similar devices are not allowed to be used as calculator during class time and Tests.

**METHOD OF INSTRUCTION AND EVALUATION:**

In this class, you will engage in structured in-class and out-of-class activities. You will achieve the course objectives through interactive lecture, in class practice problems, class participation, homework assignments, and assessments. Every student will be assigned a data set. See project outline on last page of this syllabus.

Assessment	Grade Points	Percent of Final Grade
3 Tests	500	50%
Project	100	10%
MyStatLab Homework	200	20%
Final Exam	200	20%
Total	1000	100%

**GRADING POLICY:**

Your grade will be determined by taking the average of your test scores, homework and Final Exam:

Grade	Grading Scale
A	90 – 100%
B	80 – 89.9%
C	70 – 79.9%
D	60 – 69.9%
F	0 – 59.9% or if a student commits an act of cheating/plagiarism

**WITHDRAWALS:**

During the second week of class, professors are required to report students who have never attended, and these students will be administratively withdrawn. Following this attendance verification, it is the student’s sole responsibility to withdraw from the course and to verify that the withdrawal is properly recorded through the Registrar’s Office prior to the withdrawal deadline of July 19th. The professor cannot process withdrawals from any reason other than the above-stated student non-attendance. A withdrawal is considered an attempt.

**ACADEMIC ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:**

If you are requesting academic accommodations, you must first register with Accessibility Resources (contact information is provided below). Accessibility Resources will evaluate your request and determine eligibility. If approved, you will be provided with an Accommodation Plan that you must deliver to me either electronically or in person. Once received, we will discuss which accommodations you are requesting for this class, and in accordance with Broward College policy 6Hx2-5.09 you will be provided with the appropriate accommodations. Students who wait until after completing the course, or an activity, to request accommodations should not expect any grade to be changed, or to be able to retake the course or activity.

South Campus, Miramar West Center, Pines Center, and Weston Center: 954-201-8913

**ATTENDANCE POLICY:**

You are required to attend all classes. There will be no penalty for a student who is absent from academic activities because of religious holiday observances in his/her own faith, the student’s serious illness, death in immediate family, or attendance to statutory governmental responsibilities. The students must notify the instructor of these absences, providing necessary documentation. It is the student’s responsibility to make up the work missed.

**STATEMENT OF ACADEMIC DISHONEST:**

Broward College expects its students to be honest in all of their coursework and activities. Breaches of academic honesty include, but are not limited to, cheating, plagiarism, misrepresentation, bribery, and the unauthorized possession of examinations, papers, or other class materials that have not been formally released by instructors. A student’s academic work must be the result of his or her own thought, research, or self-expression. The term “cheating” includes but is not limited to, copying homework assignments from another student; working together with another individual on a take-home test or homework when specifically prohibited from doing so by the instructor, looking at test, notes or another person’s paper during an examination when not permitted to do so. (See current BC catalog statement at [www.broward.edu/catalog/](http://www.broward.edu/catalog/)).

## STA 2023 Course Schedule

Day/Date	Chapter	Topic and Learning Outcomes	Activities
Day 1 06/27	1.1 1.2 1.3	<b>Orientation, Introduction, Preview and Statistical Thinking</b>  <b>Types of Data</b> <ul style="list-style-type: none"> <li>Define the terms data, statistics, parameter, sample, and population and identify them in context.</li> <li>Define quantitative and categorical variables and labels and identify them in context.</li> </ul>	<a href="#">Text</a> 1.1/1.2 Statistical Thinking and Critical Thinking 1.3 Types of Data Read 1.1/1.2 p. 3 – 11 Read 1.3 p. 15 - 20
	2.1	<b>Frequency Distributions</b> <ul style="list-style-type: none"> <li>Construct and interpret frequency, relative frequency, and cumulative frequency distribution tables.</li> </ul>	<a href="#">Text</a> 2.1/2.2 Frequency Distributions Read pages 43 - 50 in the textbook.
	2.2	<b>Histograms</b> <ul style="list-style-type: none"> <li>Construct and interpret histograms</li> </ul>	<a href="#">Text</a> 2.3 Histograms 2.3: Read pages 54 - 58 in the textbook.
	2.3	<b>Stem and Leaf Plots</b> <ul style="list-style-type: none"> <li>Construct and interpret stem-and-leaf distributions.</li> </ul>	<a href="#">Text</a> 2.4 Graphs that Enlighten and Graphs that Deceive 2.4: Read pages 63 (Stemplots only) in the textbook.
	3.1	<b>Measures of Central Tendency</b> <ul style="list-style-type: none"> <li>Calculate and interpret the mean, median, and mode of a set of numbers.</li> <li>Calculate and interpret the weighted mean.</li> <li>Determine the inter-relationships between the mean, median, and mode for skewed and symmetrical distributions.</li> <li>Calculate and interpret the mean for a frequency distribution (optional).</li> </ul>	<a href="#">Text</a> 3.2 Measures of Center Read pages 79 - 90 in textbook.
	3.2	<b>Measures of Variation</b> <ul style="list-style-type: none"> <li>Calculate and interpret the range, variance, and standard deviation of a set of numbers.</li> <li>Calculate and interpret the variance, and standard deviation for grouped data.</li> </ul>	<a href="#">Text</a> 3.3 Measures of Variation Read pages 96-104 in textbook.
	3.3	<b>Measures of Relative Standing</b> <ul style="list-style-type: none"> <li>Calculate and interpret quartiles and percentiles.</li> <li>Calculate and interpret z-scores for a normal distribution.</li> </ul>	<a href="#">Text</a> 3.4 Measures of Relative Standing & Boxplots Read pages 112-118 in textbook.
Day 2 07/02	4.1/4.2	<b>Basic Concepts of Probability</b> <ul style="list-style-type: none"> <li>Apply the classical definition of probability.</li> <li>Compute probabilities using the law of complementation.</li> </ul>	<a href="#">Text</a> 4.2 Basic Concepts of Probability Read pages 132 - 144 in textbook.
	4.3	<b>Addition Rule</b> <ul style="list-style-type: none"> <li>Compute probabilities using the laws of addition</li> </ul>	<a href="#">Text</a> 4.3 Addition Rule Read pages 149 - 152 in textbook.
	4.4/4.5	<b>The Multiplication Rules: Basics</b> <ul style="list-style-type: none"> <li>Compute probabilities using the laws of multiplication</li> </ul> <b>Multiplication Rule: Complements and Conditional Probability</b> <ul style="list-style-type: none"> <li>Compute probabilities using the laws of multiplication.</li> <li>Compute conditional probabilities.</li> </ul>	<a href="#">Text</a> 4.4 Multiplication Rule: Basics Read pages 156-163 in textbook. Read pages 168 - 171.
	4.6	<b>Counting</b>	<a href="#">Text</a> 4.6 : Counting

		<ul style="list-style-type: none"> <li>• Compute probabilities using the fundamental counting principle, permutations, and combinations.</li> </ul>	Read pages 175-180 in textbook.
<b>Day 3</b> 07/09		<b>Review of chapters 1, 2, 3 &amp; 4</b>	
<b>Day 4</b> 07/11		<b>Review &amp; Test 1</b>	
<b>Day 5</b> 07/16	5.1/5.2	<b>Random Variables</b> <ul style="list-style-type: none"> <li>• Differentiate between discrete and continuous random variables.</li> <li>• Given a distribution, decide whether it satisfies the requirements of a probability distribution.</li> <li>• Calculate the mean (expected value) and standard deviation for a given random variable.</li> <li>• Solve problems involving the expected value.</li> </ul>	<u>Text</u> 5.2 Probability Distributions Read pages 195 - 206 in textbook.
	5.3 5.4	<b>Binomial Probability Distributions</b> <ul style="list-style-type: none"> <li>• Decide whether a given distribution is binomial.</li> <li>• Calculate the binomial probability using the table or technology.</li> <li>• Calculate the binomial probability using the binomial formula.</li> </ul> <b>Parameters for the Binomial Distribution</b> <ul style="list-style-type: none"> <li>• Calculate the mean and standard deviation of a binomial distribution.</li> </ul>	<u>Text</u> 5.3 Binomial Probability Distributions Read pages 210 - 217 in textbook. 5.4 Parameters for Binomial Distributions Read pages 223-225 in textbook.
<b>Day 6</b> 07/18	6.2	<b>The Standard Normal Distribution</b> <ul style="list-style-type: none"> <li>• Identify the properties of the standard and nonstandard normal distributions.</li> <li>• Use the standard and nonstandard normal distributions to determine probabilities.</li> <li>• Determine values in the standard and nonstandard normal distributions when given specific probabilities.</li> </ul>	<u>Text</u> 6.2: The Standard Normal Distribution Read pages 237 - 249 in textbook.
	6.3	<b>Applications of the Normal Distribution</b> <ul style="list-style-type: none"> <li>• Identify the properties of the standard and nonstandard normal distributions.</li> <li>• Use the standard and nonstandard normal distributions to determine probabilities.</li> <li>• Determine values in the standard and nonstandard normal distributions when given specific probabilities</li> </ul>	<u>Text</u> 6.3 Applications of Normal Distributions Read pages 270-276 in textbook.
	6.5	<b>The Central Limit Theorem</b> <ul style="list-style-type: none"> <li>• Explain the meaning of the Central Limit Theorem and its properties associated with the distribution of sample means.</li> <li>• Use the Central Limit Theorem to determine probabilities for distributions of sample means.</li> </ul>	<u>Text</u> 6.5 Central Limit Theorem Read pages 278 - 285 in textbook.
	7.1/7.2	<b>Estimating a Population Proportion</b> <ul style="list-style-type: none"> <li>• Determine point estimates for population proportions.</li> <li>• Construct confidence intervals for population proportions.</li> <li>• Determine the sample sizes necessary to estimate population proportions within a given error.</li> </ul>	<u>Text</u> 7.2 Estimating a Population Proportion Read pages 317-331 in textbook.
	7.3	<b>Estimating a Population Mean: <math>\sigma</math> known</b> <ul style="list-style-type: none"> <li>• Determine point estimates for the population mean.</li> <li>• Construct confidence intervals for the population mean.</li> </ul>	<u>Text</u> 7.3 Estimating a Population Mean Read pages 347-349 in textbook.

		<ul style="list-style-type: none"> <li>Determine the sample sizes necessary to estimate population means within a given error.</li> </ul>	
	7.3 (cont.)	<b>Estimating a Population Mean: <math>\sigma</math> unknown</b> <ul style="list-style-type: none"> <li>Determine point estimates for the population mean.</li> <li>Construct confidence intervals for the population mean.</li> <li>Determine the sample sizes necessary to estimate population means within a given error.</li> </ul>	<u>Text</u> 7.3 Estimating a Population Mean: $\sigma$ Not Known Read pages 337-347 in textbook.
07/18		<b>Review Chapters 5, 6, 7</b>	
Day 7 07/23		<b>Review &amp; Test 2</b>	
Day 8 07/25	8.1/8.2	<b>Basics of Hypothesis Testing</b> <ul style="list-style-type: none"> <li>Determine the null and alternative hypotheses that would be used to test a claim.</li> <li>Describe, analyze, and differentiate between Type I and Type II errors.</li> <li>Determine the rejection region(s), and construct a sketch of the region(s).</li> </ul>	<u>Text</u> 8.2 Basics of Hypothesis Testing Read pages 375-388 in the textbook (Focus on p value method throughout chapter 8.)
	8.3	<b>Testing a Claim about a Proportion</b> <ul style="list-style-type: none"> <li>Decide when to use the z statistic and be able to determine the correct values for this statistics for various hypothesis tests.</li> <li>Determine the p-value for a hypothesis test involving the z-test statistic.</li> <li>Calculate the sample z test statistic for given sample data.</li> <li>Decide whether to reject or fail to reject the null hypothesis based upon comparison of the test statistic value and the rejection region, or comparison of the p-value and the level of significance.</li> <li>Translate the hypothesis test conclusion into a meaningful holistic answer to the original problem situation.</li> <li>Students should be able use the traditional method to perform a hypothesis test by stating null and alternative hypotheses for a test, delineating the critical region for rejection of the null hypothesis, computing the appropriate test statistic, formulating the proper conclusion, and applying this structure to the tests of hypotheses regarding the proportion of a population by using a z statistic.</li> </ul>	<u>Text</u> 8.3 Testing a Claim About a Proportion Read pages 393 – 401 in the textbook.
	8.4 9.3	<b>Testing a Claim about a Mean</b> <ul style="list-style-type: none"> <li>Decide when to use the z statistic and be able to determine the correct values for this statistics for various hypothesis tests.</li> <li>Determine the p-value for a hypothesis test involving the z-test statistic.</li> <li>Calculate the sample z test statistic for given sample data.</li> <li>Decide whether to reject or fail to reject the null hypothesis based upon comparison of the test statistic value and the rejection region, or comparison of the p-value and the level of significance.</li> <li>Translate the hypothesis test conclusion into a meaningful holistic answer to the original problem situation.</li> <li>Students should be able use the traditional method to perform a hypothesis test by stating null and alternative hypotheses for a test, delineating the critical region for rejection of the null hypothesis, computing the appropriate test statistic, formulating</li> </ul>	<u>Text</u> 8.4 Testing a Claim About a Mean: $\sigma$ Known Read pages 406 – 413 in the textbook.

		<p>the proper conclusion, and applying this structure to the tests of hypotheses regarding the mean of a population by using a <math>z</math> statistic.</p> <p><b>Testing a Claim about a Mean: <math>\sigma</math> Not Known</b></p> <ul style="list-style-type: none"> <li>Decide when to use the <math>t</math> statistic, and be able to determine the correct values for this statistics for various hypothesis tests.</li> <li>Determine the <math>p</math>-value for a hypothesis test involving the <math>t</math>-test statistic.</li> <li>Calculate the sample <math>t</math> test statistic for given sample data.</li> <li>Decide whether to reject or fail to reject the null hypothesis based upon comparison of the test statistic value and the rejection region, or comparison of the <math>p</math>-value and the level of significance.</li> <li>Translate the hypothesis test conclusion into a meaningful holistic answer to the original problem situation.</li> <li>Students should be able use the traditional method to perform a hypothesis test by stating null and alternative hypotheses for a test, delineating the critical region for rejection of the null hypothesis, computing the appropriate test statistic, formulating the proper conclusion, and applying this structure to the tests of hypotheses regarding the mean of a population by using a <math>t</math> statistic.</li> </ul> <p><b>Testing a Claim about Two means, Independent samples.</b></p>	
Day 9 07/30		<b>Review &amp; Test 3</b>	
Day 10 08/01		<b>Final review</b>	
Day 11 08/06		<b>Final Exam</b>	

NOTE: Any changes in the Course Outline and Syllabus will be announced.

## Project:

Using **Statdisk** software available at <https://www.statdisk.org/>

The student will create a project based on a data set assigned by the instructor.

## Structure:

Description of the data set.

Descriptive statistics. Comments on descriptive statistics. For instance, compare mean value, standard deviation, coefficient of variation, boxplot, assess normality.

Construct a 90%, 95% and 99% Confidence Intervals. Describe the intervals in words.

Conduct a T test. Step by Step Hypothesis testing.

Compare the conclusion of the T test and the corresponding Confidence Interval.