## 2024-2025 Introduction to Statistics

**Period 3 (9:57 – 10:51 AM)**

**ROOM #37**

Mrs. Traci Bernardy, Instructor

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**Prep:** Period 1 (8:05 – 8:58 am) **Home #:** 507/747-2545

**Study Hall:** Period 7 (2:12 – 3:05 pm) **School #:** 507/342-5114 ext 143

# Course Overview

Course Objective: To provide students with both the theoretical and practical aspects of Statistics. Including an introduction to the measures of central tendency, measures of dispersion, frequency distributions, large and small samples, testing of hypotheses, and correlation analysis. Students will use computer in statistical analysis in application of the concepts covered.

# Calculus Course Outcomes

The student will…

1. Identify the underlying population of a statistical study.
2. Identify the variables of interest.
3. Collect data on a random sample using an appropriate sampling technique.
4. Identify outliers in a data set.
5. Use graphical and numerical method to summarize data.
6. Estimate the population parameters.
7. Check for model assumptions.
8. Conduct proper hypotheses testing.
9. Reach valid conclusions.
10. Use Statistical Software.

# Prerequisites

In order to be ready for the content of this course, students should have previously covered the following topics.

1. Algebraic techniques for solving and manipulating equations
2. Functions and Graphing

**Primary Textbook: :** *Elementary Statistics: Picturing the World,* 7th Edition, Ron Larson & Betsy Farber  ©2019 Pearson Education Inc./Savvas Learning

**Internet Resources at**: [*pearson.com/mylab/statistics*](https://www.pearsonmylabandmastering.com/northamerica/mystatlab/)

Most sections of the text will be presented with one day of lecture followed by one or two days of classroom work. A variety of technology will be used to help students better understand the topics being discussed. Focus will be on both theoretical and application of topics. Students will be encouraged to ask clarification questions as the lesson progresses. During non-lecture days, a collaborative working environment in the classroom will be established for students to work together in groups and for large group discussions.

All students have a graphing calculator for exploration and computation. Additional Statistical software that will be used during the course includes a spreadsheet application such as Microsoft Excel or Google Sheets. Access to a laptop and or computer system will be necessary for these applications.

Teacher made tests and quizzes will comprise the majority of the student evaluation. Chapter tests may be divided into two parts: 1) no computer/calculator and 2) computer/calculator required, each part including free-response and multiple choice questions. Free response questions must be answered using well written sentences to explain their mathematical outcomes. Homework is observed on a daily basis and a small portion of their grade will reflect their efforts.

If you have questions or problems which you need additional help with, please use all your resources to get help with these items. Ask a parent, classmate or feel free to arrange a time to meet with me outside of class. I am available during my prep and study hall periods, before and after school, as well as in the evenings if need be. Feel free to call me at home if that would be helpful. If you want to meet with me, just let me know the day and time and I will do my best to make arrangements.

Course Outline & Learner Outcomes:

*(The course outline is subject to adjustment through the school year and the timeline is approximate.)*

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|  | **Focus of Lessons - Learner Outcomes** | **Assessment** | **Time**  **(in days)** |
| *Chapter 1 –*  *Introduction to Statistics* | 1 – Differentiation between Sample & Population data  2 – Data Classification  3 – Sampling Techniques and Experimental Design  *SW recognize the sample & related population of a statistical study, identify variables of interest & the data type.*  *SWBAT collect data of a random sample using an appropriate sampling technique.* | Test/Activity | 6 |
| *Chapter 2 –*  *Descriptive Statistics* | 1 – Frequency Distributions & Their Graphs  2 – Other Graphical Methods of Summarizing Data  3 – Measures of Central Tendency  4 – Measures of Variation  5 – Measures of Position  *SWBAT read and create Bar, Pie, Stem & Leaf, Histogram, Box & Scatter Plots.*  *SWBAT calculate & interpret Mean, Median, trim Mean, Quartile, Variance, Standard Deviation, Range, IQR & Percentiles.* | Quizzes, Chapter Test | 10 |
| *Chapter 3 –*  *Probability* | 1 – Basic Probability & Counting  2 – Conditional Probability & Multiplication Rule  3 – The Addition Rule  4 – Additional Topics in Probability & Counting  *SWBAT recognize situations requiring differences in how to calculate probability from raw data and graphical presentations - applying various counting methods.* | Quizzes,  Chapter Test | 12 |
| *Chapter 4 –*  *Discrete Probability Distribution* | 1 – Probability Distributions  2 – Binomial Distributions  3 – Geometric & Poisson Distributions (?)  *SWBAT distinguish between discrete and continuous random variables.*  *SWBAT create graphs and find summarizing statistics for discrete & binomial probability distributions.* | Quizzes, Project/Activity  Chapter Test | 6 |
|  | ***END OF QUARTER 1 (Tentative)*** | *Cumulative Test* | *Oct 31* |
| *Chapter 5 –*  *Normal Probability Distributions* | 1 – Introduction to Normal Distributions & the Standard Normal Distribution  2 – Normal Distributions: Finding Probabilities  3 – Normal Distributions: Finding Values  4 – Sampling Distributions & Central Limit Theorem  5 – Normal Approximations to Binomial Dist.  *SW interpret graphs & find the area under standard norm curve Approximate Binominal probability using normal dist.*  *SWBAT find probabilities for Normally distributed variables using a table/tech. Find & use z-scores. Interpret & apply the Central Limit Th’m to find probability of a sample mean.* | Quizzes,  Project/Activities  Chapter Test | 14 |
| *Chapter 6 – Confidence Intervals* | 1 – Confidence Intervals for the Mean (σ known)  2 – Confidence Intervals for the Mean (σ unknown)  3 – Confidence Intervals for Population Proportions  4 – Confidence Intervals for Variance and Standard Deviation  *SWBAT find and interpret estimates, margin of error, confidence intervals and determine req’d sample size & population proportion.*  *SW use t-distribution & Chi-square distributions.* | Quizzes, Activities  Chapter Test | 15 |
|  | ***END OF QUARTER 2 (Tentative)*** | *Cumulative Test* | *Jan 10* |
| *Chapter 7 – Hypothesis Testing with One Sample* | 1 – Introduction to Hypothesis Testing  2 - Hypothesis Testing for the Mean (σ known)  3 – Hypothesis Testing for the Mean (σ unknown)  4 – Hypothesis Testing for Proportions  5 – Hypothesis Testing for Variance & Std Deviation  *SW know terminology and steps to complete Hypothesis testing, what type of test, identify type errors.*  *SWBAT find and interpret results of Hypothesis test including the P-value for means, applying the t-distribution, & the z-test for a population proportion. SWBAT calculate and apply the Chi-square test to variance & std deviation.* | Quizzes, Activities  Chapter Test | 22 |
| *Chapter 8 – Hypothesis Testing with Two Samples* | 1 – Testing the Diff. Btwn Means (Indpt, σ known)  2 – Testing the Diff. Btwn Means (Indpt, σ unknown)  3 – Testing the Diff Btwn Means (Dependent sample)  4 – Testing the Difference Between Proportions  *SW determine if 2 samples are independent or dependent.*  *SWBAT recognize when to use and to perform 2-sample z-tests & t-tests.* | Quizzes, Activities  Chapter Test | 12 |
| *Chapter 9 – Correlation & Regression* | 1 – Correlation  2 – Linear Regression  3 – Measures of Regression & Prediction Intervals  4 – Multiple Regression  *SWBAT distinguish between correlation & causation.*  *SWBAT find and test correlations coefficients, find and use a regression equation, find & interpret variation about a regression equation in single and multiple variables.* | Quizzes, Activities  Chapter Test | 24 |
|  | ***END OF QUARTER 3 (Tentative)*** | *Cumulative Test* | *Mar 18* |
| *Chapter 10 –*  *Chi-Square Tests and the F-distribution* | 1 – Goodness-of Fit Test  2 – Independence  3 – Comparing Two Variances  4 – Analysis of Variance  *SWBAT Chi-Square test to find if freq distribution fits the expected distribution.*  *SWBAT Use contingency tables with expected freq & how to use Chi-squre to determine independent variables.*  *SWBAT use & interpret F-distribution & F-table, and perform a 2-sample F-test for comparison of 2 variances.*  *SW use the One way ANOVA.* | Quizzes, Activities &  Chapter Test | 8 |
| *Ch 11 –*  *Nonparametric Test* | 3 – The Kruskal-Wallis Test | Quiz | 3 |
|  | ***END OF QUARTER 4 (Date is Tentative)*** | *Cumulative Final Exam* | *May 19 - May 21* |
|  | ***End of Course Project*** |  |  |

**CLASS PROCEDURES**

**All Scenarios:**

* Question of the Week will be posted and collected via a Schoology.
* A weekly Lesson Plan will be posted on Schoology.
* Daily Assignments will be posted as a Discussion on Schoology.
* SMART Board work/presentations will be posted as a .pdf in Schoology.
* The text book and any supplemental materials will be available on Schoology.
  + The text is in a folder identified as such and sorted by chapter.
  + Supplemental materials (worksheets, notes, videos, links to quizzes/exams etc.) will be located in Schoology sorted into the folder for the current chapter.
* Watch both Schoology & your SCHOOL email for communication from me.

**Hybrid Learning – Scenario 2**

* If you are not present, will be expected to connect via Zoom during your class period for instruction and question/answer sessions.
* Zoom sessions will be recorded and posted in Schoology to also review later as needed.
* Assignments given will be treated the same as if everyone was present.
* Tests which are scheduled will, for the most part, still be given in class to those students present as scheduled and to the other group on the next day present.
* Sometimes, an exam may be switched to a Schoology online exam, you may be asked to make a presentation via flip-grid or some combination.
* For any online exam, a picture of your work must be submitted with your exam to receive credit.
* Quizzes may utilize Schoology or the app Quizizz, or continue to be given via paper on present day.

**Distance Learning – Scenario 3**

* You will be expected to connect via Zoom during your class periods assigned hour for instruction and question/answer sessions.
* Zoom sessions will be recorded and posted in Schoology to also review later as needed.
* Assignments given will be treated the same as if everyone was present.
* Tests which are scheduled will be adjusted to an online exam, the format may change depending on the section we are covering at the time.
* You may be asked to make a presentation via flip-grid, do a Schoology exam or some combination.
* For any online exam, a picture of your work must be submitted with your exam to receive credit.
* Quizzes may utilize Schoology or the app Quizizz.

**E-Learning Days**

* The E-Learning Assignment will be posted on Schoology by 9 AM and is due the next day in class unless otherwise noted on the assignment post. Assignments ARE COLLECTED as proof of attendance as per the school policy.
* Watch your SCHOOL EMAIL and SCHOOLOGY for communications from me.
* I will be available for questions during the normal school day hours. I can be contacted by email or my home phone. Zoom sessions can be arranged as necessary.

Satisfactory completion of each semester of this course counts as 0.5 credits each toward graduation math requirements. No credit will be given to a student who is continually absent from the class as per the Wabasso HS attendance policy.

Your grade will be determined by points earned in each of these categories:

***Test scores****.* You may retake any test throughout the grading period, within 2 weeks of the original test date or before the next test. If you would like to take advantage of this option, you need to contact me to set up a time outside of class to do so. Any test you retake will be averaged with the score from your original test – but will not decrease your current test score.

**WHS Grading**

100 - 95% A

94 – 90% A-

89 – 87% B+

86 – 84% B

83 – 80% B-

79 – 77% C+

76 – 74% C

73 – 70% C-

69 – 67% D+

66 – 64% D

63 – 60% D-

59 & below F

***Quiz scores****:* Quizzes will be given periodically over a section. These may be retaken and are scored in the same manner as tests.

***Final Exams***. A cumulative Final exam will be given at the end of each Quarter and will count as approximately 10% of the total grade.

***Homework*.** I will be collecting each chapter review and points will be given for completion and correctness. For all other assignments, I expect that you will check your answers on any odd-numbered problems assigned with the back of the book. I will read answers for any even numbered problems and go through any problems on which we have questions. I will periodically give points to students for completion of the assignment. Late assignments will be penalized 10% daily and not accepted after 5 days. I will also periodically collect “grades” on an assignment. If I plan to do that on any assignment other than the chapter review, you will be notified in advance.

***Project(s):*** Project(s) will be included in this course to integrate the use of statistics and computer analysis to allow you to see how it can be applied.

***Effort****.* Your effort in class activities & attitude will affect your final grade. Points for effort will be awarded at mid-term and at the end of the quarter

***Extra Credit*** will be available from the “Question of the Week” when posted. Each correct answer turned in with work shown, name, course name, period, and date will receive 2 points extra credit. These will be posted and turned in via Schoology. The answer must be turned in by 8:05AM on the following Monday.

Classroom Expectations: All class members are to meet these expectations, working to the best of their ability to make this a great learning experience. When the Classroom Expectations, as defined below, are not met, I reserve the right to implement a punishment that I feel is appropriate.

1. Be an Active Listener. Do not socialize or cause a disruption while the teacher is instructing.
2. Do your BEST work.
3. Be ready to start class when the bell rings. Be quiet. Be physically & mentally ready for class to begin. Bring necessary materials and completed homework assignments.
4. Respect everyone & everything in the room.
5. NO POP OR FOOD! Water only!
6. Backpacks are not allowed in the classroom.
7. No electronic Devices may be on/ used unless specific permission is granted.
8. Phones may not be used and should be placed in the pouches upon entering the classroom. Smart Watches are not to be used and may not be worn during testing.

Consequences when our Classroom Expectations are not met:

* **First offense - Verbal Warning**: A discussion with the student to be reminded of the classroom expectations after class or otherwise individually. The parent will be emailed.
* **Second offense**: The student will receive a second verbal warning, and a phone call will be made to their parent/guardian about the offense.
* **Third offense:** The student will be asked to remain after class, where he/she will be issued an after-school detention with Mrs. Bernardy and reminded of the classroom expectations and discuss solutions to the issues. An email or phone call about the offense will be made to their parent/guardian.
* **Fourth offense**: The student will be referred to the administration. A parent(guardian)/student/ teacher/counselor/administration meeting will be held to develop a behavior plan to address the offense.
* **Subsequent Violations**: Students who continue to exhibit negative behavior after the third violation will be dealt with individually.

**\*\*Please note:** If necessary, this series of consequences may be adjusted to meet the needs of each individual student.

**Severe Clause:** Any student who severely disrupts class by fighting, destroying property, refusing to follow directions, talking back to the teacher, or any other behavior not conducive to a positive learning environment will be removed

immediately from the classroom and sent to administration.