Pleasure Ridge Park High School

Course Syllabus

Advanced Placement Statistics	Mr. Matt Thrasher
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1 Carnegie Unit (weighted)	E-mail: matt.thrasher@jefferson.kyschools.us

Office Hours: **Planning Period Monday-Thursday, 12:30-1:30 p.m. Fridays 9:30-11:30, 12:30-2:30. Additional Help available outside of school hours by request through School CNXT App (please do not contact me after 9 pm)**

Teacher website: **http://www.thrashermath.weebly.com**

Course description:

Descriptive statistics: graphical representation and numerical summaries of date. Elementary probability. Basic concepts of sampling and experimental design, Linear correlation and regression. Interval estimates and hypothesis testing, including chi-square and ANOVA. Two years of high school algebra and one year of high school geometry, or their equivalent are strongly recommended as preparation for this course.

Statistics includes: EXPLORING DATA (observing patterns and departures from patterns): interpreting graphical displays of distributions of univariate data, summarizing distributions of univariate data, comparing distributions of univariate data, exploring bivariate data, exploring categorical data - frequency tables. PLANNING A STUDY: overview of methods of collecting data, planning and conducting surveys, planning and conducting experiments. ANTICIPATING PATTERNS: (producing models using probability and simulation): probability as relative frequency, combining independent random variables, the normal distribution, simulating sampling distributions. STATISTICAL INFERENCE (confirming models): confidence intervals, tests of significance, t-distributions. SHOWING DATA: using excel and Minitab as well as TI-83/84 calculators produce representations of data in graphical form.

Prerequisite: Precalculus

Textbook:

Bock, Velleman and DeVeaux. (2015). Stats Modeling the World AP Edition, 4th Edition. Boston, MA Pearson Education, Inc.

Supplemental materials:

Rossman and Chance. (2012). Workshop Statistics: Discovery with Data, 4th Edition. Danvers, MA John Wiley & Sons, Inc.

Yates, Moore & Starnes (2008). The Practice of Statistics, 3rd Edition. New York, NY W.H. Freeman and Co.

Barron 's How to Prepare for the AP Statistics Exam by Martin Sternstein

Required Materials: TI-83 plus graphing calculator, 3-ring binder for notes

Course Requirements

Classroom policies: ATTENDANCE IS VERY IMPORTANT. Students absent due to prescheduled events, such as field trips, meetings, signing out early, or any school-related activity are responsible for turning in previous day's assignment and picking up new assignment PRIOR to leaving school.

- Attendance is mandatory. Three unexcused absences within an advisory may result in failure.
    - Students must present written excuses to get full credit for late assignments and make-up any missed tests. Excuses should be brought in upon return to class but no later than a week after the absence. The grades of late assignments will be dropped by 10%.
    - Students may also be required to attend class before or after school. This may be planned or unplanned depending on the class's progress through the topic outline.
- Students are expected to bring their materials (including graphing calculator and textbook) with them to class every day.
- Students will be working in cooperative groups; they are expected to develop their ability to contribute to and benefit from working together in teams.
- Students are expected to take the advanced placement examination in May.

Grading

- Grades are based on the following criteria: tests, test corrections, labs, homework, explorations and review problems.
- Final course grade is the *weighted* average of the six categories.

Assignment Weighting

Student Progression:

Daily (Homework and Labs)	20%
Quizzes	30%

Student Mastery:

Tests and Projects	35%
Test Corrections	10%
FRAPPYs	5%

Grade Scale

Grade	Percentage
A	90 – 100
B	80 - 89
C	70– 79
D	60 - 69
U	0 – 59

Tests

Tests are usually given every three weeks. They may be taken in class under normal test conditions or take-home. Tests are graded by percentages.

Test Corrections

Test corrections are analysis of errors made on tests. Students will write analyses of mistakes and then correctly re-work the problems. They are evaluated by letter grades. Test corrections do not replace original test scores. They are separate scores.

Labs

Labs are extended cooperative learning assignments that will be completed to further understanding and teach content. They will be started in class and completed outside of class. They are evaluated by letter grades. You will get a rubric to understand how these are to be evaluated.

Homework

• Homework assignments are those textbook exercises and handouts that are given on your assignment sheet. Assignment sheets are distributed at the beginning of each chapter.

• Homework will be reviewed in class. However, do not count on every problem being discussed. Use the back of the book to check answers to odd numbered questions.

• Additional help is available from the teacher after school.

YEARLONG TOPIC OVERVIEW

Part I: Organizing Data: Looking for Patterns & Departures from Patterns

I. Exploring Data

1. Stats Starts Here
2. Displaying and Describing Categorical data (pie charts, histograms, ogives, and stem-and-leaf plots)

TEST 1

3. Displaying and Summarizing Quantitative Data (mean, median, mode, midrange, weighted mean, geometric mean, harmonic mean, quadratic mean, and trimmed mean)
4. Understanding and Comparing Distributions (Quantities and Box plots)
5. The Standard Deviation as a Ruler and the Normal Model (Dispersion & Variance)

TEST 2

II. Exploring Relationships Between Variables

6. Scatterplots, Association and Correlation (Direction, Form, Strength, Correlation Coefficient)
7. Linear Regression (Residuals, Least Squares, Predicted Value)
8. Regression Wisdom (Extrapolation, Influential points, Lurking Variables)
9. Re-Expressing Data: Get It Straight! (logarithms, ladder of powers)

TEST 3

III. Gathering Data

10. Understanding Randomness
11. Sample Surveys (Population, Samples, Bias)
12. Experiments and Observational Studies (Treatments, Control group, Blinding, Confounding)

TEST 4

IV. Randomness and Probability

13. From Randomness to Probability (Law of Large Numbers, Theoretical vs. Personal Probability, Sample Space)
14. Probability Rules (Conditional, Independence)

TEST 5

15. Random Variables (Expected Value and Variance)
16. Probability Models (Bernoulli trials, 10% Condition, Binomial probability, Statistically significant)

TEST 6

Part II. Producing Data: Samples, Experiments, and Simulation

V. From the Data at Hand to the World at Large

17. Sampling Distribution Models (CLT)
18. Confidence Intervals for Proportions
19. Testing Hypotheses About Proportions
20. More About Tests and Intervals (Error Types, Power, Alpha levels)
21. Comparing Two Proportions (Two-proportion z test)
TEST 7

Part III. Probability: Foundations of Inference

VI. Learning About The World

22. Inferences About Means (One sample t-test, Degrees of freedom)
23. Comparing Means (Two-sample t-test)
24. Paired Samples and Blocks (Paired t-test, Paired data)
Test 8

VII. Inference When Variables Are Related

25. Comparing Counts (Chi-squared)
26. Inferences for Regression
Test 9
27. Analysis of Variance (ANOVA)
28. Multiple Regression
Test 10

VIII. AP Exam Review & Final Review

FINAL EXAM

Student Equity: Creating, supporting, and sustaining a culture of access and equity require being responsive to students' backgrounds, experiences, cultural perspectives, traditions, and knowledge when designing and implementing a mathematics program and assessing its effectiveness. Acknowledging and addressing factors that contribute to differential outcomes among groups of students are critical to ensuring that all students routinely have opportunities to experience high-quality mathematics instruction, learn challenging mathematics content, and receive the support necessary to be successful. Addressing equity and access includes both ensuring that all students attain mathematics proficiency and increasing the numbers of students from all racial, ethnic, linguistic, gender, and socioeconomic groups who attain the highest levels of mathematics achievement.

Teacher/Student Norms for NTI 2.0

1. **Check Google Classroom each morning before class**-check for the link to our google meet. Also check to see if there are any documents that you may need to download or print off for the day's class activity!
2. **Have video on**--To be actively present in our virtual classroom, it requires a live feed of your attendance. Pictures are not a live representation
3. **Mute microphone unless "Given the Mic"**--When addressing the class, you are "Given the Mic" which means that you have the speaking voice at the time. All other mics are muted. You receive the class attention
4. **Permission is not necessary to go to the bathroom or leave the room**--If you leave the screen for a few minutes, it will not disrupt class. The class knows you have to attend business elsewhere for a short time and return. You should return within a reasonable amount of time
5. **Use the "Raise the Hand" feature to address the class/teacher**--Once the teacher addresses you, you will be "Give the MIc"
6. **When called upon, always start by saying your name**--Example, "This is Leesa, and my question is…"
7. **Dress appropriately for class**--Be prepared to address the class as if you were in a public setting. Be mindful of your appearance in regards to pajamas, body parts covered, hats and shirts with writing.
8. **Prepare a classroom environment at home**--Join the classroom virtually in a quiet place away from distractions.
9. **Show visual respect to the speaker(s) by keeping your head up and giving attention**.
10. **Interact with the class**--It is not the same as watching a movie
11. **Limit background music, television, conversations, etc. in order to not be heard by others.**
12. **Be aware of what your camera is showing in the background**--be sure your camera is in a stable position and focused at eye level, if possible. Doing so helps create a more direct sense of engagement with other participants.
13. **Avoid multitasking**--You'll retain the discussion better if you refrain from replying to emails or text messages during the meeting and wait to work on that PowerPoint presentation until after the meeting ends.
14. **Prepare materials in advance**--If you will be sharing content during the meeting, make sure you have the files and/or links ready to go before the meeting begins.
15. **Check Google Classroom each morning before class**-check for the link to our google meet. Also check to see if there are any documents that you may need to download or print off for the day's class activity! (I know this is repeated—but this is important---you must be prepared daily)
16. **Relax**—Don't be afraid to participate! Ask questions!
17. **Contact me for extra help**!**—Use School CNXT!**

AP Statistics Example Project

The Project: Students will design and conduct an experiment to investigate the effects of response bias in surveys. They may choose the topic for their surveys, but they must design their experiment so that it can answer at least one of the following questions:

- Can the wording of a question create response bias?
- Do the characteristics of the interviewer create response bias?
- Does anonymity change the responses to sensitive questions?
- Does manipulating the answer choices change the response?

Develop a hypothesis that will enable the question you choose to study to be answered. For example, you might choose the second question and have two different interviewers

(good-cop / bad-cop style) conduct the survey. The project will be done in pairs. Students will turn in one project per pair. A written report must be typed (single-spaced, 12-point font), and included graphs should be done on the computer using Minitab or Excel.

Proposal: The proposal should

- describe the topic and state which type of bias is being investigated;
- describe how to obtain subjects (minimum sample size is 50); and
- describe what questions will be used and how they will be asked, including how to incorporate direct control, blocking, and randomization.

Written Report: The written report should include a title in the form of a question and the following sections (clearly labeled):

- Introduction: What form of response bias was investigated? Why was the topic chosen for the survey?
- Methodology: Describe how the experiment was conducted and justify why the design was effective. Note: This section should be very similar to the proposal.
- Results: Present the data in both tables and graphs in such a way that conclusions can be easily made. Make sure to label the graphs/tables clearly and consistently. Perform a hypothesis test on the data gathered and report conclusions based on statistical inference.
- Conclusions: What conclusions can be drawn from the experiment? Be specific. Were any problems encountered during the project? What could be done differently if the experiment were to be repeated? What was learned from this project?
- The original proposal.

Product:
The product should completely summarize the project yet be simple enough to be understood by any reader. Students should include some pictures of the data collection in progress. The product can be electronic or physical in nature. You do not have to meet in person to collaborate on this project.

Oral Presentation: Both members will participate equally. The product should be used as a visual aid. Students should be prepared for questions.