Basic Applied Statistics
STAT 0200
4 Credits

Description: This course teaches methods of descriptive and inferential statistics. Topics include data collection and description, hypothesis testing, correlation and regression, the analysis of variance, and contingency tables (chi square). Students will learn how to use a statistical computer package, MINITAB.

Prerequisite: Two years of high school algebra are recommended.

Grading: Students will be evaluated based on their performance on at least one midterm exam and a final exam, as well as additional unit exams, quizzes, and homework to be assigned at the discretion of the teacher.

Textbook: The recommended textbook is *The Practice of Statistics*, any edition, by Starnes, Yates, and Moore, or *Introduction to the Practice of Statistics,* by Yates, Moore, and McCabe, W.H. Freeman & Co. Publishers; or, *Elementary Statistics: Looking at the Big Picture*, 1st ed., by Nancy Pfenning, Brooks/Cole Cengage Learning [Cengage can be reminded that books are to be sold royalty-free to Pitt CHS students]. Alternate textbooks may be used but must include the material in this course outline. As of Fall 2016 we no longer have certified CHS STAT 0200 courses that use Triola as their sole textbook.

The following topics are covered in the University of Pittsburgh STAT 0200 course. The statistical package MINITAB is used for most of the topics below:

1. Introduction: What is statistics? Types of data.

2. Descriptive statistics (one variable): Histograms, box plots, symmetry and skewness, mean, median, percentiles, range, interquartile range, the standard deviation.

3. Association and Regression: Scatter plots, correlation, fitting straight lines, meaning of slope and intercept, residuals, coefficient of determination (r-squared).

4. Causation and Evidence: Use of observational studies or experiments to attempt to answer questions of causation. Some basic types of sampling and experiments-stratified samples, simple and blocked designs.

5. Probability: Random variables and their distributions: Basic probability rules, discrete random variables, rules for means and variances. Statistical independence, independent observations. Normal and binomial distributions.

6. Distribution of sample proportion and distribution of sample mean from random samples: Central limit theorem, law of large numbers. Hands-on or computer simulations of sampling distributions.

7. Confidence intervals for means (known standard deviation) and proportions in one sample: Construct confidence intervals from data; use computer experiments to illustrate concept.

8. Tests of hypotheses about means (known standard deviation) and proportions in one sample: P-value, level of significance. Type I and Type II error. Meaning of (but not calculation of) power and relation to effect size, sample size, and size of standard deviation. Computer experiments to illustrate these concepts.

9. One-sample, paired-sample and two-sample t-tests: Degrees of freedom and use of t-tables. Related confidence intervals. Interpretation of computer output concerning tests and confidence intervals. Advantages and disadvantages of paired designs over two-sample designs.

10. Introduction to more advanced topics: One-way analysis of variance tests (ANOVA table, degrees of freedom, sums of squares and mean squares, F statistic and F tables), contingency tables and chi-square tests for independence, inference concerning the slope(s) and intercept in linear regression models.

Additional course credit information for STAT 0200:

At the University of Pittsburgh:
- Majors: This is a course that can be used for some social sciences. Students intending to major in a math- or science-related field should not take this course and would need to take a statistics course for science majors such as the University of Pittsburgh's STAT 1000.
- Electives: Individual Schools and Colleges of the University (such as Engineering, Arts & Sciences, Business, Information Sciences, and so on) have different policies about elective credits and may count this course as an elective. Students interested in studying at the University of Pittsburgh should contact their School/College of interest to see if this course would be counted.

Academic Integrity: All College in High School teachers, students, and their parents/guardians are required to review and be familiar with the University of Pittsburgh's Academic Integrity Policy located online at www.as.pitt.edu/fac/policies/academic-integrity.

Grades: Grade criteria in the high school course may differ slightly from University of Pittsburgh standards. A CHS student could receive two course grades: one for high school and one for the University transcript. In most cases the grades are the same. These grading standards are explained at the beginning of each course.

Transfer Credit: University of Pittsburgh grades earned in CHS courses appear on an official University of Pittsburgh transcript, and the course credits are likely to be eligible for transfer to other colleges and universities. Students are encouraged to contact potential colleges and universities in advance to ensure their CHS credits would be accepted. If students decide to attend any University of Pittsburgh campuses, the University of Pittsburgh grade earned in the course will count toward the student grade point average at the University. At the University of Pittsburgh, the CHS course supersedes any equivalent AP credit.

Drops and Withdrawals: Students should monitor progress in a course. CHS teacher can obtain a Course Drop/Withdrawal Request form from the CHS office or Aspire. The form must be completed by the student, teacher and parent/guardian and returned to teacher by deadlines listed. Dropping and withdrawing from the CHS course has no effect on enrollment in the high school credits for the course.

CENTRAL DAUPHIN HIGH SCHOOL

437 Piketown Road
Harrisburg, PA 17112
717-703-5360
717-703-5730 (Fax)

Kenneth Miller, Principal
Robert Benkovic, Assistant Principal
Kristin Herb, Assistant Principal
Eric Shrader, Assistant Principal
Justin Newkam, Assistant Principal

R.A.M.S. PRIDE
Resiliency-Acceptance-Motivation-Strength

College in High School Statistics (CHS Stats)
Advanced Placement Statistics (AP Stats)

Course Syllabus

Professor: Bob Moreland

Location(s): Online, Remote & CDHS Room 160

> M-F   9:19 – 10:00 (section 1)
> M-F 10:04 – 10:45 (section 2)
> M-F 11:34 – 12:15 (section 3)
> M-F 11:34 – 12:15 (section 4)

> Devices are to be used for classroom purposes only, as directed by the teacher.
>
> Remote Learning: Video **on** for full participation

Contact email: bmoreland@cdschools.org

Textbook: *Introduction to Statistics & Data Analysis, Peck, Olsen & Devore [Cengage 2016]*

> *An understanding of statistics and correlation analysis is key to interdisciplinary insight, leadership and continuous improvement growth in every modern industry.*

This course is a CHS [College in High School] course taught concurrently with AP [Advanced Placement]. In addition, more than the basic requirements of CHS are met during the school year to ensure students are able to apply statistics meaningfully in the world.

CHS students will take the standardized University of Pittsburgh Final Exam for full university credit as enrolled university students. AP students will differ only in the final exam by taking the AP exam in lieu of the U Pitt final exam. Students may take both the university and the AP exam, however, University of Pittsburgh will first recognize university credit, taking precedence over the AP score.

Many Tier 1 colleges do not accept each other's credit (EG: Yale, Penn & MIT frequently do not accept each other's credits.) However, Pitt reports an overall 90% acceptance rate for their credits. Acceptance is often negotiable with persistence in my own experience.

CHS students must register on ASPIRE for university credit with the University of Pittsburgh by September 16th. Parents must consent by September 20th. Payment of $75 per credit ($300) is due September 21st to October 1st. Withdrawal deadline October 1st. Please see Mr. Moreland ASAP for confidential financial assistance.

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CHS & AP Stats

Course Syllabus (continued)   Instructor: Bob Moreland

Supplies:

Laptop or Notebook (PC or Mac) is recommended but not required for class. As a Google Chromebook will **not** run Minitab, students will need access to a home PC, the CDHS Library or Computer Lab.

Skype will be used for remote meetings. This may run on any smart device or computer. Once you create an account, send a 'wave' to: RobertPaulMoreland@gmail.com

Graphic Calculator (any brand is welcome, TI-84 plus will be demonstrated in class)

Internet Access outside of class (Windows or MacOS for web research, to run Minitab & Google Suite or MS Office)

An Online Textbook is available for purchase (but not required):
    ISBN-13: 978-1305115347   **ISBN-10:** 1305115341

    CHS: Dr. Pfenning's textbook *Elementary Statistics Looking at the Big Picture* is recommended (but NOT required) for concept comparisons: **ISBN-10:** 0495016527
    AP: Please purchase and follow a study guide from either Barron's or The Princeton Review (online or print).
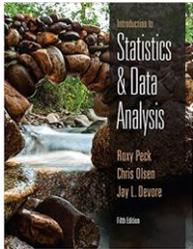
Expectations:

A positive attitude and a willingness to try!   Encourage others to learn.
Prepared to learn and on time.   Follow school rules.
Respectful of self & others.   Video **on** during remote instruction.
One person talks at a time.

Portfolio:

Students will be required to maintain a math portfolio to aid in organization and review of key concepts. **This portfolio will be submitted in Google Classroom.** This folder is subject to grading after each unit and may be used as evidence of the student's homework progress & grade. The portfolio consists of homework and definitions with formula sheets by chapter.

☞   Homework Assignments & Performance Tasks are on Mr. Moreland's CDHS District Teacher page [Google: Moreland CDHS] and in Google Classroom. Portfolios are always due in Google Classroom at the end of each unit on test day.

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CHS & AP Stats

Course Syllabus (continued)   Instructor: Bob Moreland

Grading

Scale: A 90-100%   B 80-89%   C 70-79%   D 60-69%   F 50-59%

☞ University of Pittsburgh grading will conform to U Pitt standards and will be independent of the CDHS grade. Please see pages 1 & 2 for the U Pitt syllabus.

Grading for each Marking Period will conform to CDHS district & Math department guidelines. The Pitt grade is designed to resemble the CD MP grade as closely as possible:

> 50% Tests
> 25% Quizzes & Projects
> 25% Homework, Classwork & Participation
>
> (Per school policy, late work is docked 10% per day, 3 days max – please see the district website for exceptions as well as the latest make-up or test re-take policy. Again, please Google 'cdschools moreland' to access make-up work.)

The final exam is worth 10% of the CD overall grade but usually worth 20% of the overall Pitt grade. (Students just taking the AP Exam may be exempt, depending upon current policy.) If possible, this will be the only difference in grading.

> Classwork & Participation Rubric:
>
> > **100%**   Student honestly attempts each portion of warm-up or assigned exercises, gives meaningful oral and written answers during class, is respectful to self and others and obeys all school rules (eg: behavior, dress code, device usage, …) **Online**: student participates with video on.
> > **50%**   Student is lacking in either complete or meaningful attempt of oral or written work but follows all rules OR student performs all work as described above but disobeys rules or direction in such a way that does not disrupt class.
> > **0%**   Student performs little work or refuses classwork (any), demonstrates disruptive or disrespectful behaviour or both.
>
> * Test, Project & Review days are weighted heavier than regular days.

NB: Some quizzes and projects are collaborative in nature. As such, a few such grades will be partially known to group partners. If you wish to avoid this, please let the instructor know as soon as possible so that accommodations may be made.

The AP Exam is scheduled for **Noon** on **Thursday, May 13th**.

Our goal is for **every student** to succeed with confidence !