

# **Pascack Valley Regional High School District**

**Pascack Hills High School, Montvale, New Jersey  
Pascack Valley High School, Hillsdale, New Jersey**

**Course Name:     Statistics I**

Born On: August, 2017  
Previous Revision: August, 2022  
Current Revision: August, 2023  
Board Approval: 8/28/23

## **COURSE DESCRIPTION: Statistics I**

*Statistics I* is a half-year, 2.5 credit course that is designed to help students analyze statistics for the purpose of making determinations on typical values and variation. Students will learn to model data sets in order to draw conclusions and make predictions. 11th and 12th grade students enrolled in Statistics I and Statistics II have the option of earning college credit by registering with William Paterson University at a reduced price but at student expense. Please note that dual enrollment is not required, and that the course will have the same requirements and expectations whether or not students elect to register for college credit.

All mathematics courses in the Pascack Valley Regional High School District *are* designed to address multiple learning styles and needs, and accommodations and modifications are made for students with disabilities, multilingual students, students at risk of failure, gifted and talented students, and students with 504 plans. Students are encouraged to analyze data using tools and models to make valid and reliable claims (9.4.12.IML.3), and various technologies are integrated throughout the curriculum, including scientific calculators, graphing calculators, specialized software, and various Internet programs and subscriptions. These tools enrich the curriculum by giving students' access to additional mathematical representations, and they also help to differentiate by providing students with additional options to engage with mathematical tasks.

The Pascack Valley Regional High School Mathematics Department integrates 21st century life and career skills across its courses, with the dual goal of informing students about careers and fields of study that use mathematics (9.3.ST.5, 9.3.ST-ET.5 and 9.3.ST-SM.2), and helping students improve the quantitative, mathematical, and statistical reasoning skills they will need to be effective producers and consumers of quantitative information in their everyday lives (9.2.12.CAP.2). Mathematics courses address the *New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills*, with a particular emphasis on demonstrating the ability to reflect, analyze and use creative skills and ideas (9.4.12.CI.1), investigating new challenges and opportunities for personal growth, advancement and transition (9.4.12.CI.3), identifying problem-solving strategies used in the development of an innovative product or practice (9.4.12.CT.1), and explaining the potential benefits of collaborating to enhance critical thinking and problem solving (9.4.12.CT.2). Mathematics courses also address the *New Jersey Student Learning Standards for English Language Arts Companion Standards*, with a particular focus on following complex multistep procedures (RST.9-10.3/RST.11-12.3), determining the meaning of symbols, key terms, and other domain-specific words and phrases (RST.9-10.4/RST.11-12.3), and translating quantitative or technical information expressed in words into visual forms and translating information expressed visually or mathematically into words (RST.9-10.7). Similarly, the mathematics department seeks to support students by providing them with opportunities to use quantitative, statistical, and mathematical reasoning in interdisciplinary contexts, in contexts that are meaningful to students, and in contexts that attend to the contributions and perspectives of historically marginalized groups. Specifically, mathematics courses will look to incorporate, when appropriate, contributions and experiences of people from the LGBTQ+ community and individuals with disabilities, and references to issues of social and cultural relevance, including climate change.

| <p><b>Statistics I:</b> This half-year, 2.5 credit course is designed to help students analyze statistics for the purpose of making determinations on typical values and variation. Students will learn to model data sets in order to draw conclusions and make predictions.</p>  |   |  |   |  |   |
|--|---|--|---|--|---|
| Content/Topic:   | Key Learning Items/Concepts and Pacing Guide  | Observable Proficiencies and Skills:   | NJSLS   | Formative, Summative, Benchmark, and Alternative Assessments   | Core Instructional and Supplemental Materials/ Modifications and Accommodations   |
| <p><b>Unit I – Data and Distributions</b></p> <p><b>Time:</b> 7-8 weeks (See next column for specific time frames)</p> <p><b>Content Statements:</b><br/>Students will be able to display and describe categorical and quantitative variables.</p> <p>Students will become comfortable working with the Normal model.</p> <p><b>Enduring Understandings:</b><br/>When a measured variable with units answers questions about the quantity being measured, the variable is quantitative.</p> <p>When a variable answers questions about how cases fall into categories, the variable is</p> | <p><b>Key learning items/concepts:</b></p> <p>What is Statistics? (2 days)</p> <p>Identify categorical variables and create appropriate displays (2 days)</p> <p>Identify quantitative variables and create appropriate displays (2 days)</p> <p>Given sets of data find measures of center, shape, and spread and be able to determine the impact potential outliers have on these measures (7 days)</p> <p>Determine what happens to measures of center and spread when data is shifted and scaled (2 days)</p> <p>Define z-scores; Calculate z-scores using the formula; Use z-scores to compare data across</p> | <p><i>Summarize, represent, and interpret data on a single count or measurement variable</i></p> | <p><b>NJSLS Content Standards</b></p> <p>S-ID 1<br/>S-ID 2<br/>S-ID 3<br/>S-ID 4</p> <p><b>NJSLS SMP</b></p> <p>MP1. Make sense of problems and persevere in solving them<br/>MP2. Construct viable arguments and critique the reasoning of others<br/>MP3. Reason abstractly and quantitatively<br/>MP4. Model with mathematics<br/>MP5. Attend to precision<br/>MP6. Use appropriate tools strategically<br/>MP7. Look for and make use of structure<br/>MP8. Look for and express regularity in repeated reasoning</p> <p><b>NJSLS for ELA</b></p> | <p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency. Assessment tools may include the following:</p> <ul style="list-style-type: none"> <li>- quizzes (F)</li> <li>- tests (S)</li> <li>- performance tasks (F/S)</li> <li>- projects (S)</li> <li>- homework (F)</li> <li>- discussions (F)</li> <li>- journals (F)</li> <li>- Form A, B, or C benchmark (B)</li> <li>- alternative assessments (A)</li> <li>- normal comparison project (S)</li> </ul> | <p>Selection of primary sources<br/><i>Suggestion(s):</i><br/>Texts: <i>STATS Modeling The World</i> 3rd Edition, Bock, Velleman, De Veaux; College Board problems (advanced); Deltamath (remediation, on grade level, and advanced)</p> <p>Resources:</p> <ul style="list-style-type: none"> <li>- Core Math Tools</li> <li>- Microsoft Excel</li> <li>- Fathom</li> <li>- TI-83/84 Calculator</li> </ul> <p><b>Modifications and Accommodations:</b><br/><b>Students with special needs:</b><br/>Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible</p> |

|   |   |  |  |  |  |
|---|---|--|--|--|--|
| <p>categorical.</p> <p>The distribution of a quantitative variable can be described by identifying the shape of the distribution, numerical center, numerical spread, and noting unusual features such as outliers.</p> <p>If a normal model is appropriate, z-scores are standardized scores that can measure the number of standard deviations a data point lies from the mean.</p> <p>In the normal model 68% of the data lies within one standard deviation of the mean, 95% of the data lies within two standard deviations of the mean, and 99.7% of the data lies within three standard deviations of the mean.</p> <p>Technology and the z-score table can be used to find percentages below, above, and between z-scores.</p> <p>Technology and the z-score table can be used to find the z-scores associate with given percentiles.</p> | <p>different distributions; Use z-scores to determine of a data point is “unusual” (2 days)</p> <p>Be able to use Normal models and the 68-95-99.7 rule to estimate the percentages that fall within 1,2, and 3 standard deviations of the mean (3 days)</p> <p>Use the z-score table and technology to calculate percentages below, above, between z-scores; Use the z-score table and technology to find z-scores associate with bottom, top, middle percentiles (5 days)</p> <p>Solve word problems using knowledge of z-scores and percentages (3 days)</p> <p><b>Content-specific modifications and accommodations</b></p> <ul style="list-style-type: none"> <li>- use multiple representations and technology to support conceptual understanding</li> <li>- allow calculator use to focus attention on conceptual understanding</li> </ul> <p><b>Interdisciplinary/additional connections</b></p> <ul style="list-style-type: none"> <li>- draw on contexts with applications from other fields</li> <li>- draw on contexts with climate change applications</li> </ul> |  | <p><b>Companion Standards</b></p> <p>RST.9-10.3<br/>RST.9-10.4<br/>RST.9-10.7<br/>RST.11-12.3<br/>RST.11-12.4</p> <p><b>NJSLS-CLKS - 21<sup>st</sup> Century Life and Careers</b></p> <p>9.4.12.CI.1<br/>9.4.12.CI.3<br/>9.4.12.CT.1<br/>9.4.12.CT.2</p> <p><b>- Technology</b></p> <p>9.4.12.IML.3<br/>9.4.12.TL.2<br/>9.4.12.IML.4<br/>9.4.12.IML.9<br/>9.4.12.IML.10</p> <p><b>- Career Education</b></p> <p>9.2.12.CAP.2<br/>9.3.ST.5<br/>9.3.ST-ET.5<br/>9.3.ST-SM.2</p> <p><b>NJSLS – CSDT</b></p> <p>8.1.12.DA.1<br/>8.1.12.DA.5<br/>8.1.12.DA.6<br/>8.1.12.AP.1<br/>8.2.12.ETW.2</p> |  | <p>grouping to support student learning.</p> <p><b>Multilingual students:</b> Teachers and support staff will work to support multilingual students in their first language and in English, providing materials and/or resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p> <p><b>Students at risk of school failure:</b> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><b>Gifted and Talented Students:</b> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p> |
|---|---|--|--|--|--|

|  |   |  |  |  |  |
|--|---|--|--|--|--|
|  | - draw on contexts from diverse populations |  |  |  |  |
|--|---|--|--|--|--|

| <p><b>Statistics I:</b> This half-year, 2.5 credit course is designed to help students analyze statistics for the purpose of making determinations on typical values and variation. Students will learn to model data sets in order to draw conclusions and make predictions.</p>  |   |  |  |   |  |
|--|---|--|--|---|--|
| Content/Topic:   | Key Learning Items/Concepts and Pacing Guide  | Observable Proficiencies and Skills:   | NJSLS  | Formative, Summative, Benchmark, and Alternative Assessments  | Core Instructional and Supplemental Materials/ Modifications and Accommodations  |
| <p><b>Unit 2 – Regression and rates of change</b></p> <p><b>Time:</b><br/>4-5 weeks (See next column for specific time frames)</p> <p><b>Content Statement:</b><br/>Students will be able to explore the relationships between two quantitative variables.</p> <p><b>Enduring Understandings:</b><br/>Scatterplots display patterns, trends, and relationships between two quantitative variables.</p> <p>Correlation is a measure of the direction and strength</p> | <p><b>Key learning items/concepts:</b></p> <p>Algebra 2 sketching line of best fit review (1 day)</p> <p>Define explanatory and response variables; Create a scatter plot and determine the equation of the LSRL using technology; Identify the slope, y-intercept, explanatory and response variables in context (5 days)</p> <p>Define and know the facts about the correlation coefficient (r) (3 days)</p> <p>Define “Residual” and use the formula to calculate residuals (2 days)</p> <p>Given the averages, standard deviations, and correlation coefficient for two quantitative variables, write the equation of the</p> | <p><i>Summarize, represent, and interpret data on two categorical and quantitative variables</i></p> <p><i>Interpret linear models</i></p> | <p><b>NJSLS Content Standards</b></p> <p>S-ID 5<br/>S-ID 6<br/>S-ID 7<br/>S-ID 8<br/>S-ID 9</p> <p><b>NJSLS SMP</b></p> <p>MP1. Make sense of problems and persevere in solving them<br/>MP2. Construct viable arguments and critique the reasoning of others<br/>MP3. Reason abstractly and quantitatively<br/>MP4. Model with mathematics<br/>MP5. Attend to precision<br/>MP6. Use appropriate tools strategically<br/>MP7. Look for and make use of structure<br/>MP8. Look for and express regularity in repeated reasoning</p> <p><b>NJSLS for ELA</b></p> | <p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency. Assessment tools may include the following:</p> <ul style="list-style-type: none"> <li>- quizzes (F)</li> <li>- tests (S)</li> <li>- performance tasks (F/S)</li> <li>- projects (S)</li> <li>- homework (F)</li> <li>- discussions (F)</li> <li>- journals (F)</li> <li>- Form A, B, or C benchmark (B)</li> <li>- alternative assessments (A)</li> <li>- regression modeling task (F)</li> </ul> | <p>Selection of primary sources<br/><i>Suggestion(s):</i><br/>Texts: <i>STATS Modeling The World</i> 3rd Edition<br/>Bock, Velleman, De Veaux; College Board problems (advanced); Deltamath (remediation, on grade level, and advanced)</p> <p>Resources:</p> <ul style="list-style-type: none"> <li>- Core Math Tools</li> <li>- Microsoft Excel</li> <li>- Fathom</li> <li>- TI-83/84 Calculator</li> </ul> <p><b>Modifications and Accommodations:</b><br/><b>Students with special needs:</b><br/>Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible grouping to support student learning.</p> |

|  |  |  |  |   |
|--|--|--|--|---|
| <p>of the linear association between two quantitative variables.</p> <p>Correlation does not mean causation.</p> <p>Through technology, the equation of the least squares regression line (LSRL) can be created and used to interpolate and extrapolate.</p> | <p>LSRL<br/>(3 days)</p> <p>Linear Regression Review Project<br/>(3 days)</p> <p><b>Content-specific modifications and accommodations</b></p> <ul style="list-style-type: none"> <li>- use multiple representations and technology to support conceptual understanding</li> <li>- allow calculator use to focus attention on conceptual understanding</li> </ul> <p><b>Interdisciplinary/additional connections</b></p> <ul style="list-style-type: none"> <li>- draw on contexts with applications from other fields</li> <li>- draw on contexts with climate change applications</li> <li>- draw on contexts from diverse populations</li> </ul> |  | <p><b>Companion Standards</b></p> <p>RST.9-10.3<br/>RST.9-10.4<br/>RST.9-10.7<br/>RST.11-12.3<br/>RST.11-12.4</p> <p><b>NJSLS-CLKS<br/>- 21<sup>st</sup> Century Life and Careers</b></p> <p>9.4.12.CI.1<br/>9.4.12.CI.3<br/>9.4.12.CT.1<br/>9.4.12.CT.2</p> <p><b>- Technology</b></p> <p>9.4.12.IML.3<br/>9.4.12.TL.2<br/>9.4.12.IML.4<br/>9.4.12.IML.9<br/>9.4.12.IML.10</p> <p><b>- Career Education</b></p> <p>9.2.12.CAP.2<br/>9.3.ST.5<br/>9.3.ST-ET.5<br/>9.3.ST-SM.2</p> <p><b>NJSLS – CSDT</b></p> <p>8.1.12.DA.1<br/>8.1.12.DA.5<br/>8.1.12.DA.6<br/>8.1.12.AP.1<br/>8.2.12.ETW.2</p> | <p><b>Multilingual students:</b> Teachers and support staff will work to support multilingual students in their first language and in English, providing materials and/or resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p> <p><b>Students at risk of school failure:</b> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><b>Gifted and Talented Students:</b> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p> |
|--|--|--|--|---|

| <p><b>Statistics I:</b> This half-year, 2.5 credit course is designed to help students analyze statistics for the purpose of making determinations on typical values and variation. Students will learn to model data sets in order to draw conclusions and make predictions.</p>  |   |   |   |   |  |
|--|---|---|---|---|--|
| Content/Topic:   | Key Learning Items/Concepts and Pacing Guide  | Observable Proficiencies and Skills:  | NJSLS   | Formative, Summative, Benchmark, and Alternative Assessments  | Core Instructional and Supplemental Materials/ Modifications and Accommodations  |
| <p><b>Unit 3 –</b> Sample Surveys, Observational Studies, and Experimental Design</p> <p><b>Time:</b> 5-6 weeks (See next column for specific time frames)</p> <p><b>Content Statement:</b><br/>Students will understand how to design sample surveys, observational studies, and experiments.</p> <p><b>Enduring Understandings:</b><br/>Conducting a census is oftentimes impractical. Well-designed surveys that incorporate random selection of members of a population are effective in learning about a population.</p> <p>Observational studies can be retrospective or prospective, and allow a researcher to determine if there is an</p> | <p><b>Key learning items/concepts:</b><br/>Introduction to what is means to be random (1 day)</p> <p>Identify survey methods and explain biases associated with each (4 days)</p> <p>Identify observational studies as retrospective or prospective, and understand the strengths and weaknesses of each method (2 days)</p> <p>Recognize the response variable, factors, levels, and treatments in the description of a designed experiment (4 days)</p> <p>Be able to design and explain a completely randomized experiment to test the effect of a single factor, including -randomly assigning treatments to the experimental units</p> | <p><i>Understand and evaluate random processes underlying statistical experiments</i></p> <p><i>Make inferences and justify conclusions from sample surveys, experiments, and observational studies</i></p> | <p><b>NJSLS Content Standards</b></p> <p>S-IC 1<br/>S-IC 2<br/>S-IC 3<br/>S-IC 4<br/>S-IC 5<br/>S-IC 6</p> <p><b>NJSLS SMP</b></p> <p>MP1. Make sense of problems and persevere in solving them<br/>MP2. Construct viable arguments and critique the reasoning of others<br/>MP3. Reason abstractly and quantitatively<br/>MP4. Model with mathematics<br/>MP5. Attend to precision<br/>MP6. Use appropriate tools strategically<br/>MP7. Look for and make use of structure<br/>MP8. Look for and express regularity in repeated reasoning</p> | <p>Students will be assessed regularly throughout this course, with a focus on both conceptual understanding and procedural fluency. Assessment tools may include the following:</p> <ul style="list-style-type: none"> <li>- quizzes (F)</li> <li>- tests (S)</li> <li>- performance tasks (F/S)</li> <li>- projects (S)</li> <li>- homework (F)</li> <li>- discussions (F)</li> <li>- journals (F)</li> <li>- Form A, B, or C benchmark (B)</li> <li>- alternative assessments (A)</li> <li>- survey project (S)</li> </ul> | <p>Selection of primary sources <i>Suggestion(s):</i><br/>Texts: <i>STATS Modeling The World</i> 3rd Edition<br/>Bock, Velleman, De Veaux;<br/>College Board problems (advanced); Deltamath (remediation, on grade level, and advanced)</p> <p>Resources:</p> <ul style="list-style-type: none"> <li>- Core Math Tools</li> <li>- Microsoft Excel</li> <li>- Fathom</li> <li>- TI-83/84 Calculator</li> </ul> <p><b>Modifications and Accommodations:</b><br/><b>Students with special needs:</b><br/>Teachers and support staff will attend to all modifications and accommodations listed in students’ IEPs and 504s. Teachers will incorporate manipulatives, extra time, alternative assessments, scaffolding, spiraling, technology, and flexible grouping to support student learning.</p> |



|  |   |  |  |  |   |
|--|---|--|--|--|---|
| <p>association between two variables.</p> <p>The four principles of experimental design are control, randomization, replication, and blocking. Conducting a well-designed, double-blinded placebo control experiment is the only way to establish a cause and effect relationship between two variables.</p> | <p>-having a control group and/or the need for a placebo treatment<br/>                     -double-blinding on experiments with human subjects<br/>                     (7 days)</p> <p>Be able to design an experiment that incorporates blocking to reduce variation (if time allows)</p> <p><b>Content-specific modifications and accommodations</b></p> <ul style="list-style-type: none"> <li>- use multiple representations and technology to support conceptual understanding</li> <li>- allow calculator use to focus attention on conceptual understanding</li> </ul> <p><b>Interdisciplinary/additional connections</b></p> <ul style="list-style-type: none"> <li>- draw on contexts with applications from other fields</li> <li>- draw on contexts with climate change applications</li> <li>- draw on contexts from diverse populations</li> </ul> |  | <p><b>NJSLS for ELA Companion Standards</b></p> <p>RST.9-10.3<br/>                     RST.9-10.4<br/>                     RST.9-10.7<br/>                     RST.11-12.3<br/>                     RST.11-12.4</p> <p><b>NJSLS-CLKS - 21<sup>st</sup> Century Life and Careers</b></p> <p>9.4.12.CI.1<br/>                     9.4.12.CI.3<br/>                     9.4.12.CT.1<br/>                     9.4.12.CT.2</p> <p><b>- Technology</b></p> <p>9.4.12.IML.3<br/>                     9.4.12.TL.2<br/>                     9.4.12.IML.4<br/>                     9.4.12.IML.9<br/>                     9.4.12.IML.10</p> <p><b>- Career Education</b></p> <p>9.2.12.CAP.2<br/>                     9.3.ST.5<br/>                     9.3.ST-ET.5<br/>                     9.3.ST-SM.2</p> <p><b>NJSLS – CSDT</b></p> <p>8.1.12.DA.1<br/>                     8.1.12.DA.5<br/>                     8.1.12.DA.6<br/>                     8.1.12.AP.1<br/>                     8.2.12.ETW.2</p> |  | <p><b>Multilingual students:</b> Teachers and support staff will work to support multilingual students in their first language and in English, providing materials and/or resources to support students’ understanding. Students will be given additional time, as appropriate, and translation tools will be utilized as needed.</p> <p><b>Students at risk of school failure:</b> Formative and summative data will be used to monitor student success, and students at risk of failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling.</p> <p><b>Gifted and Talented Students:</b> Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.</p> |
|--|---|--|--|--|---|