Course: *Algebra II Data Science* **Unit #:** *Unit 5 - Modeling and Analyzing Univariate Data*	**Year of Implementation:** 2024-2025

Curriculum Team Members:
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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
{provide all applicable links to standards here}
https://www.state.nj.us/education/cccs/2020/

- **Unit Standards:** *(keep each of the following headings in place)*
  - ***Content Standards***
    - Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions
    - Interpreting Categorical and Quantitative Data S-ID: A.
      - Summarize, represent, and interpret data on a single count or measurement variable
  - ***21st Century Life & Career Standards***
    - 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas
    - 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition
    - 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving https://www.state.nj.us/education/cccs/2020/2020%20NJSLS-CLKS.pdf
  - ***Interdisciplinary Content Standards***
    - NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
    - SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
  - ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416)

For additional information, see

NJ Amistad Curriculum: https://www.nj.gov/education/amistad/about/

Diversity and Inclusion: ***https://www.nj.gov/education/standards/dei/index.shtml***

- *(Sample Activities/ Lessons):* ***https://www.nj.gov/education/standards/dei/samples/index.shtml***

Asian American and Pacific Islanders:

- ***Asian American and Pacific Islander Heritage and History in the U.S.***
  A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies, literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.

Transfer Goal: Students will be able to independently use their learning to explore different ways to model data of real-world phenomena.

As aligned with LRHSD Long Term Learning Goal(s): https://www.lrhsd.org/Page/6163

1. Problem-Solving: apply and transfer autonomously and collaboratively mathematical concepts and problem- solving techniques to unfamiliar, varied and real-world situations
2. Reasoning: reason abstractly and quantitatively by applying mathematical representations, symbols and estimation techniques when engaging in problem-solving
3. Critical Thinking: construct and effectively communicate valid conclusions and critique the reasoning of others
4. Modeling: demonstrate mastery of concepts by evaluating models that others have constructed or by creating appropriate models of their own
5. Tools: identify the correct tools to solve problems, if applicable
6. Precision: determine an answer's appropriateness as a means of determining its validity, while using proper mathematical notation and units
7. Structure: use multiple representations, critical thinking skills, and prior knowledge to solve problems in new situations
8. Patterns: analyze data and recognize patterns in a variety of situations
9. Habits of Mind: approach new situations with curiosity, persistence, resourcefulness, and confidence; take risks, monitor their progress, accept and learn from setbacks, make adjustments, and reflect on their performance

Enduring Understandings Students will understand that. . . *EU 1*	*Essential Questions*

<table>
<tr><td>data modeling provides deeper meaning.

EU 2
probability has a role in understanding univariate distributions.

EU 3
sampling choices impact the comparisons between data sets.</td><td>How can univariate data be collected, described, and visualized?
How can you compare data distributions?</td></tr>
<tr><td><u>Knowledge</u>
Students will know . . .

EU 1
how to investigate the purpose and benefits of multiple real-world datasets. (Modeling)
the pros and cons of using data sets of varying size (i.e. small and large samples or samples versus population). (S-ID A)
EU 2
how to formulate and investigate conjectures. (Modeling, S-ID A)
when probability can be used in a distribution. (S-ID A)
EU 3
what is sampling, the pros and cons of different sampling methods, and how samples may or may not be representative. (Modeling. S-ID A)</td><td><u>Skills</u>
Students will be able to. . .

EU 1
interpret and compare data distributions using shape, center (median and mean) and spread (interquartile range and standard deviation) through the use of technology. (S-ID A)
explore attributes of histograms, boxplots and the normal distribution. (S-ID A)
EU 2
test propositions or conjectures with specific examples.(Modeling, S-ID A)
EU 3
design a survey to collect data. (Modeling)
investigate a dataset, identify any irregularities and discuss how to perform required cleaning. (Modeling, S-ID A)</td></tr>
<tr><td colspan="2">Stage Two - Assessment</td></tr>
<tr><td colspan="2"></td></tr>
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Stage Three - Instruction

Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.** *{place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

- Data Talk: Lifespan of Mammals **(A, M, EU 1)**
- Group exploration - American Community Survey **(A, M, EU 1&2)**
- Data Talk: Billboard Hot 100, by year **(A, M, EU 1&2)**
- Group exploration & share: Telling stories with univariate data **(A, M, EU 1)**
- Group exploration & share: Telling stories with univariate data including visuals **(A, M, EU 1)**
- Activity: data science process and designing a survey **(M, T, EU 3)**
- Data Talk & exploration: Weights usage & histograms **(A, M, EU 1&2)**
- Group exploration: standard deviation and attributes normal distribution **(A, M, EU 1&2)**
- Group exploration: cleaning data **(A, M, EU 1 & 3)**
- Group exploration: comparing local and state datasets using boxplots and Google Colab. **(M, T, EU 1&2)**
- Group presentation exchange **(M, T, EU 1,2 &3)**

Pacing Guide

Unit #	***Title of Unit***	***Approximate # of teaching days***
1	Quadratic Functions	30
2	Polynomial Functions	19
3	Exponential and Logarithmic Functions	19
4	What Does Data Tell Us?	17
5	Modeling and Analyzing Univariate Data	17
6	Modeling and Analyzing Bivariate Data	17
7	Probability & Simulations	16

Instructional Materials

- *Youcubed - https://hsdatascience.youcubed.org/curriculum/*
- *desmos.com*
- *TI-Nspire*
- *Google Sheets*
- *CODAP (Concord Consortium) - https://concord-consortium.github.io/codap-data/*
- *Google CoLAB*

Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.

Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.

English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.

Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.

Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.