Course: *Algebra II Data Science* **Unit #:** *Unit 6 - Modeling and Analyzing Bivariate Data*	**Year of Implementation:** 2024-2025

Curriculum Team Members:
Steve Fardella sfardella@lrhsd.org, Maureen McMichael mmcmichael@lrhsd.org, Brooke Moore brookemoore@lrhsd.org, Mike Spera mspera@lrhsd.org

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 B.
      - Summarize, represent, and interpret data on two categorical and quantitative variables.
    - Interpreting Categorical and Quantitative Data S-ID C. 7 - 9
      - Interpret linear models
  - ***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 real-world relationships in bivariate data.

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	*Essential Questions*

Students will understand that. . . *EU 1* scatterplots can be used as a visual way of representing the relationship between two variables. *EU 2* there is a difference between correlation and causation. *EU 3* connections can be made between the data's trend and the context to make predictions.	● How is bivariate data different from univariate data and what is it good for? ● How can bivariate data be collected, described, and visualized?
<u>Knowledge</u> *Students will know . . .* *EU 1* ● bivariate data can be represented and analyzed in various ways. (Modeling, S-ID B) *EU 2* ● when bivariate data has correlation or causation (S-ID C). ● how confounding variables can impact bivariate relationships. (Modeling) EU 3 ● gathering observations and evidence about data visuals can be use to make claims and tell stories. (Modeling) ● weak and strong claims can be distinguished between. (Modeling, S-ID C)	*<u>Skills</u>* *Students will be able to. . .* *EU 1* ● represent two variable data on a scatter plot and describe how the variables are related.(S-ID B) ● use technology to compute and interpret the correlation coefficient. (S-ID C) *EU 2* ● recognize possible associations and trends in the data. (Modeling S-ID B) ● investigate correlation, causation and third variables. (Modeling, S-ID C) EU 3 ● estimate a line of best fit for a single linear regression. (S-ID C) ● determine the fit of a function by plotting and analyzing residuals. (Modeling, S-ID C)

Stage Two - Assessment	
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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* • Group Exploration: Your Water Usage **(A**, **M, EU 1)** • Group Explorations: Modeling & Analyzing Household water usage data using CODAP **(M, T, EU 1 & 2)** ○ Including line of best fit, residuals, potential outliers, r-squared • Activity: Household water usage story **(M, T EU 1)** • Data talk: correlation vs. causation **(A**, **M, EU 2)** • Group Exploration: Visual Representation of Correlation **(A**, **M, EU 1 & 2)** • Data Talk: random vs. confounding variables **(A**, **M, EU 1 & 2)** • Group Exploration: Analyzing Data like a Detective **(T, EU 3)** • Peer Review: Revision of Household Water Usage Statements **(M, EU 2 & 3)** • Activity: Introduction to Tableau **(A**, **M, EU 3)** • Group Exploration: Population and Water usage in Cities **(T, EU 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 and 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.