02 Data Science: Data Tells a Story

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This course combines the study of Statistics and Probability with Data Science. The goal is to have students think critically about data in today's data-driven world and understand its role in the 21st Century economy. Furthermore, students will become familiar with the concepts, topics, and techniques used by data scientists and statisticians in their day-to-day work.

Throughout this course, students will engage in project-based observational studies and experiments to develop their understanding of data analysis, sampling, correlation/causation, bias and uncertainty, probability, modeling with data, as well as making and evaluating data-based arguments. Students will also learn about the roles of data scientists, the power of data in society, machine learning, and how data scientists extract knowledge and insights from real-world data.

In this unit, students will be introduced to data science through a reflection of their own experiences using self-generated data, an exploration of a larger dataset of people's media use, and an analysis of business data. Through these activities, students will learn about the data science process, begin using data to tell stories, and think about the ethics involved in working with data.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Essential Questions

- What part of the story is told by data?
- What is variation?
- How is data generated?

Enduring Understandings

- CODAP and Google Sheets can be used to show how data can be used to model the world.
- There are many different ways to represent univariate, bivariate, and multivariate data.

- Each data set can be examined to determine what story can be told from its information.

CONTENT AREA STANDARDS

N.RN

A. Extend the properties of exponents to rational exponents

N.Q

A. Reason quantitatively and use units to solve problems

N.CN

A. Perform arithmetic operations with complex numbers

B. Represent complex numbers and their operations on the complex plane

C. Use complex numbers in polynomial identities and equations

N.VM

A. Represent and model with vector quantities

B. Perform operations on vectors

C. Perform operations on matrices and use matrices in applications

MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.12.RM.2: Identify types of investments appropriate for different objectives such as liquidity, income, and growth. Different types of insurance have different costs and protections. • 9.1.12.RM.3: Compare the cost of various types of insurance (e.g., life, homeowners, motor vehicle) for the same product or service, strategies to lower costs, and the process for filing an insurance claim

LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.11-12.SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Variability, data, and models play a role in determining how the story of the data is told.
- Data ethics must be considered when collecting and interpreting data.
- Asking questions relating to the data is part of the process of data storytelling.
- Various types of data include Univariate, bivariate and multivariate data
- Creating visual representations help people understand the story being told by data.
- There are ways to compile data from various sources into one document.

Procedural Knowledge

Students will be able to:

- State examples of variability in the world
- Share written work and ideas verbally in small and large group settings
- Create a unique way in which to display data found in their world
- Examine data and question whether there is more to a story than is being displayed.
- Create a slide show which outlines the data science process
- Use CODAP to model, synthesize and analyze data
- Merge data into a single spreadsheet and analyze group findings.

EVIDENCE OF LEARNING

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Formative Assessments

Observations

Task completion

Student journals and notebooks

Cooperative team work

Summative Assessments

Problem Based Learning

Unit assessment

RESOURCES (Instructional, Supplemental, Intervention Materials)

Data Science Curriculum Resource https://hsdatascience.youcubed.org/curriculum/

Unit 1

INTERDISCIPLINARY CONNECTIONS

Educational tech applications

Current Events

Experimentation

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.