09 Data Science - What's the best place for me?

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3 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 build a prioritization model to create a ranking. In this process, students will decide what they value, collect variables based on their values, gather and clean data, create functions to combine variables, normalize data, and create a weighting system for prioritizing their data. Students will do a sensitivity analysis on their weighting system. During this process, students will discuss how bias impacts mathematical models. They will use reasoning, justifications, and visualizations to explain their decisions. During this unit, students will use Google Sheets, Google Data Commons, and Tableau.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Essential Questions

- How can I build a prioritization model that will create a ranking of the best places for me to live in?

Enduring Understandings

- Decisions for a model can be made by prioritizing values in data and using them as criteria to find an optimal solution based on these values.

CONTENT AREA STANDARDS

MA.S-ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
MA.S-ID.B.6b	Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
MA.S-MD.B.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

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

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:

- Decisions for a model can be made by prioritizing values in data and using them as criteria to find an optimal solution based on these values.

Procedural Knowledge

Students will be able to:

- Explore the variables that are available in data commons for the CDC 500 cities.
- Design a model using indicators/variables to create an index to represent each dimension.
- Normalize data so that the indices are all on the same scale, allowing them to combine them to create a ranking.
- Analyze inputs and outputs from their model to understand their relationships more deeply
- Share and receive feedback on their ranking model with the class

EVIDENCE OF LEARNING

Formative Assessments

Observations

Task completion

Student journals and notebooks

Cooperative team work

Summative Assessments

PBL Assessment

Unit assessments

RESOURCES (Instructional, Supplemental, Intervention Materials)

You cubed curriculum

Unit 6 resources: https://hsdatascience.youcubed.org/curriculum/

INTERDISCIPLINARY CONNECTIONS

Educational tech applications

Current Events

Experimentation

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.