



SANTA MONICA-MALIBU UNIFIED SCHOOL DISTRICT

# Introduction to Data Science, IDS

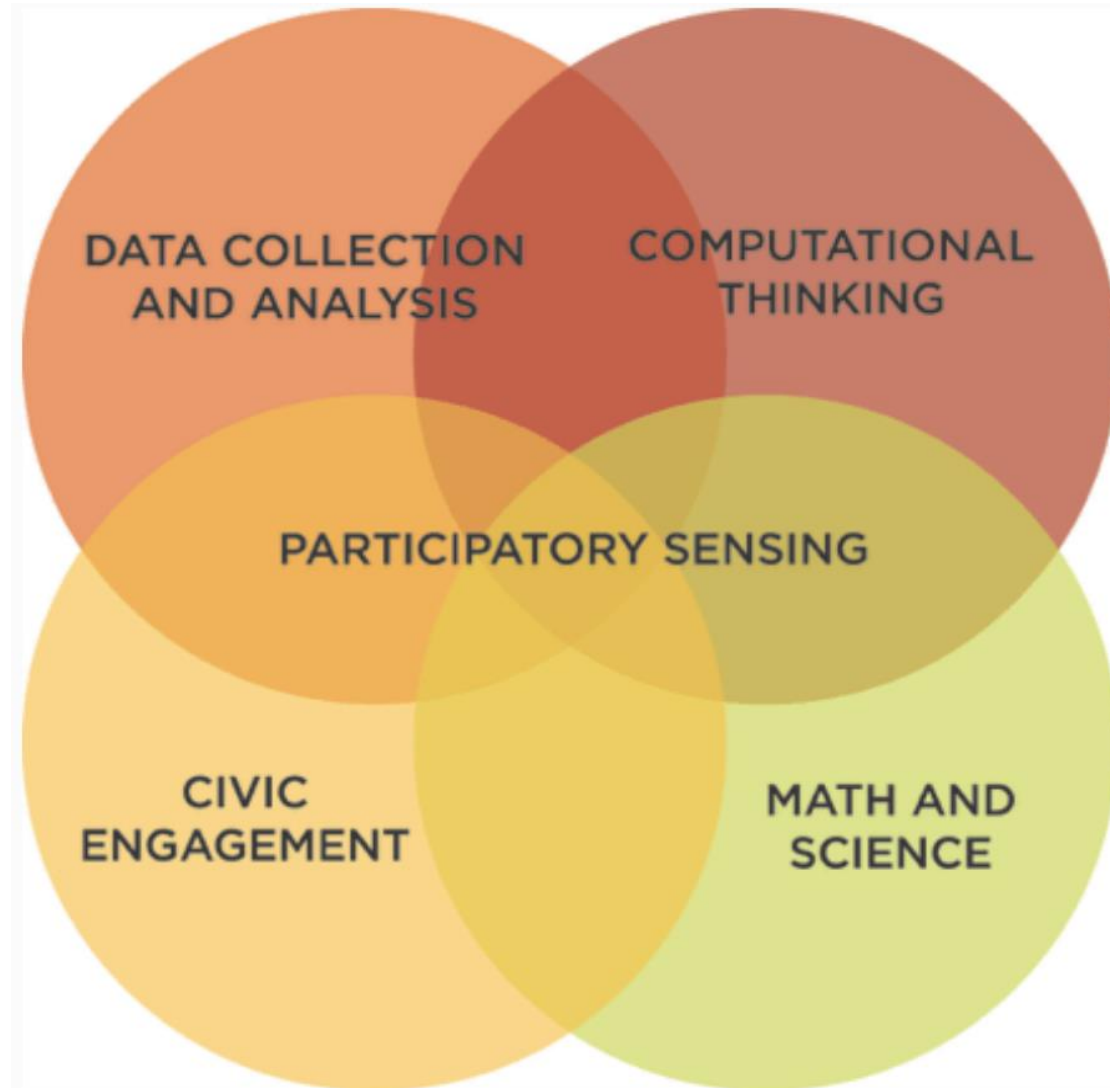
May 17, 2018



# Rationale

- To provide a senior mathematics remedy and option for a 3<sup>rd</sup>/4<sup>th</sup> year of mathematics study that supports those who may not be college ready.
- To address an alternative a-g approved, UC/CSU validated course that results in college readiness for students who need such an option/remedy.

# Pillars behind IDS

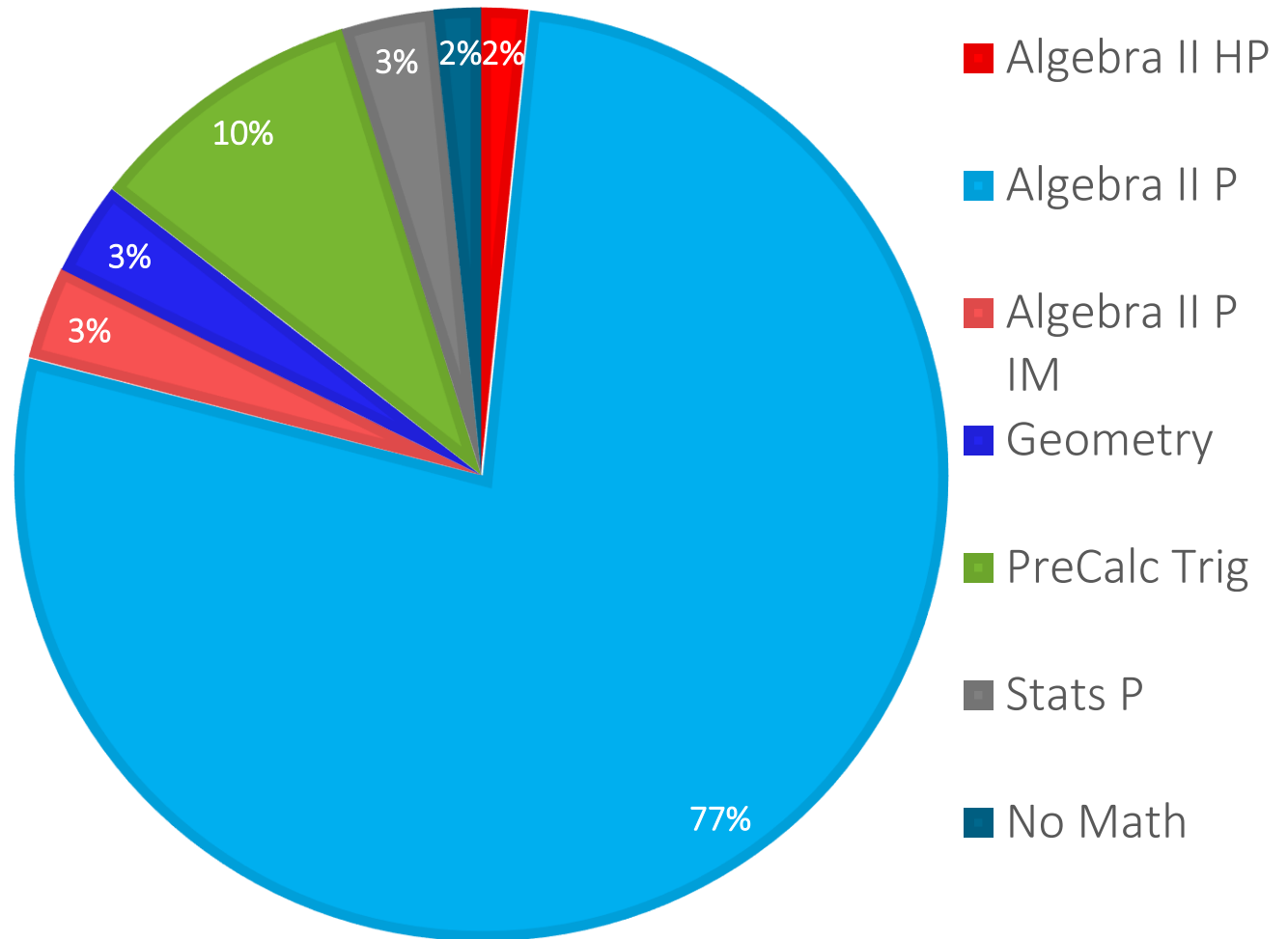




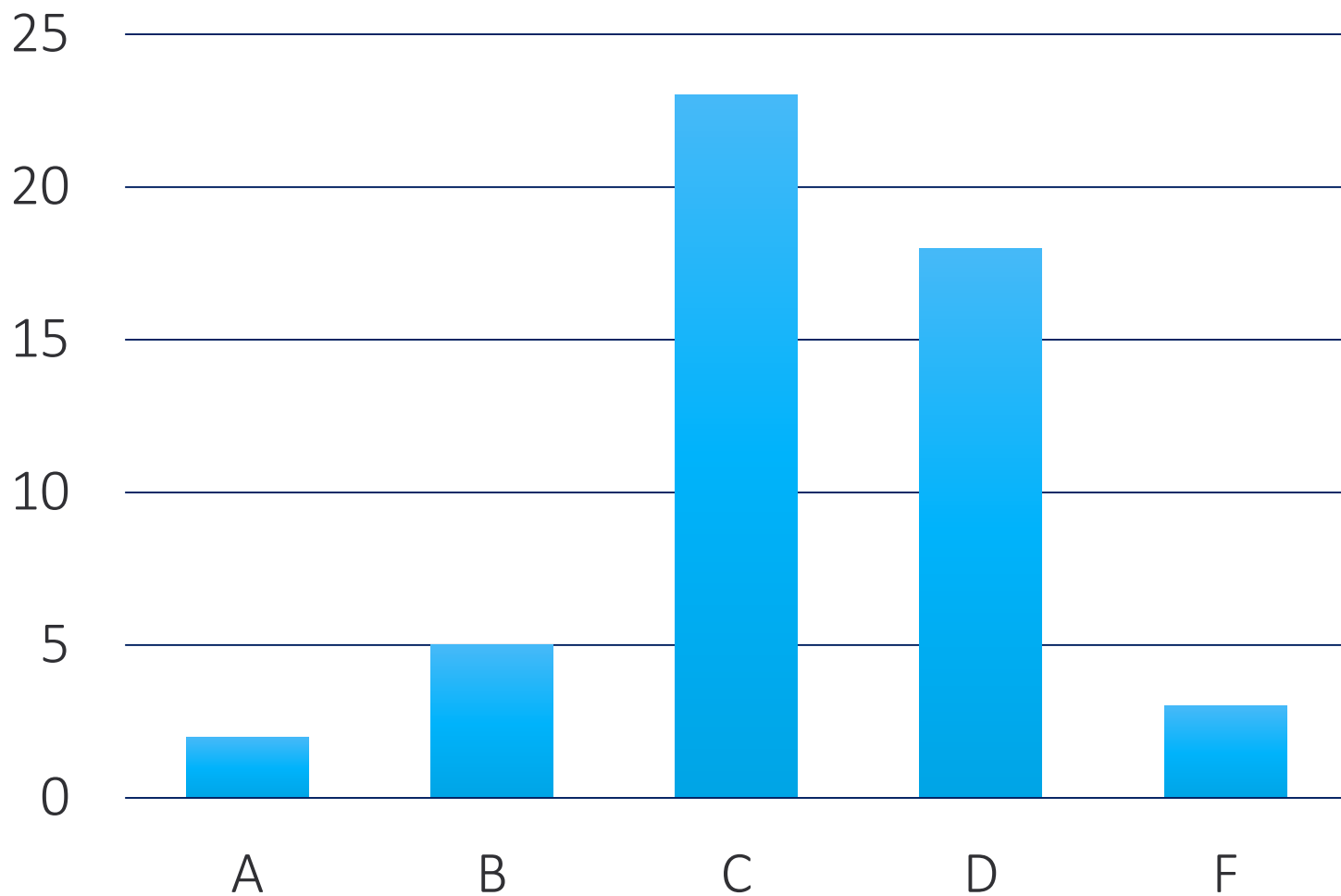
# Course Overview

- IDS curriculum focuses on practical applications of data analysis with concrete applicable skills. Students engage with Big Data that is relevant to their lives. Course provides a rigorous but accessible introduction to data science and statistics with some computer science coding. Mathematical modeling is applied throughout the course
- Four Units of Study that include graphical representations, analysis of data, evaluation of hypotheses, and discussion of biases.

## PREVIOUS MATH COURSE

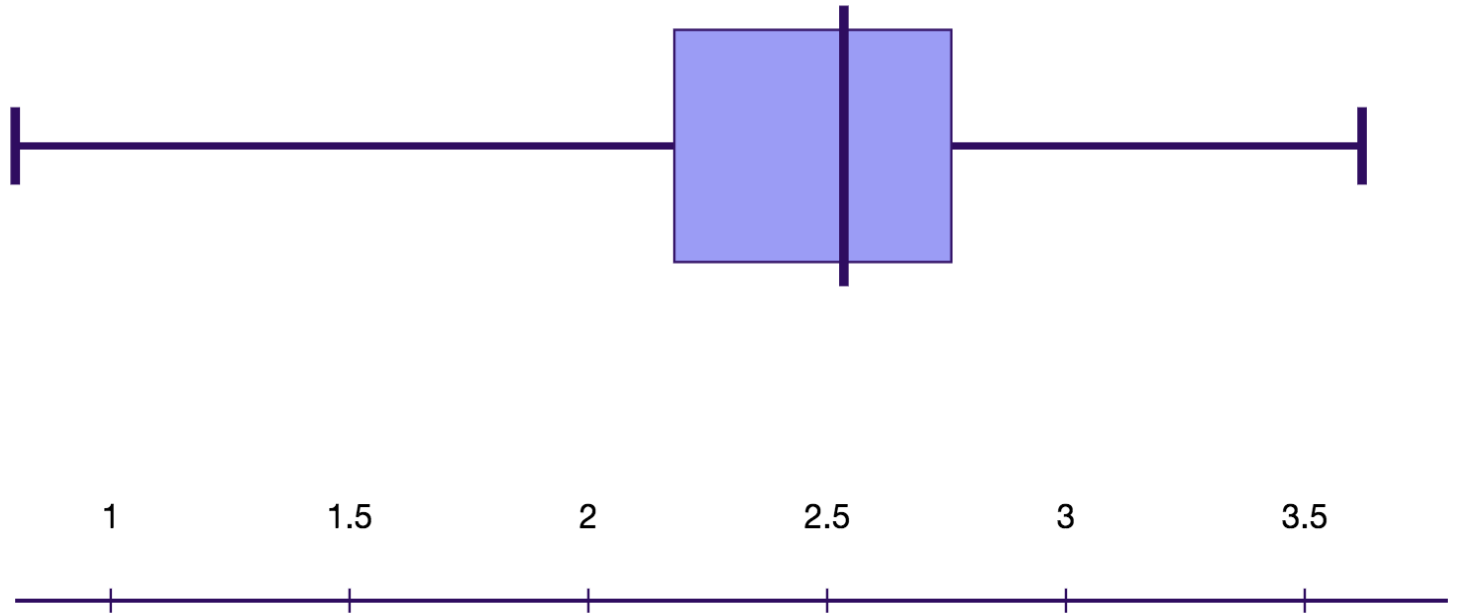


# Grades of those in an Algebra II (Algebra II P, IM P, HP)

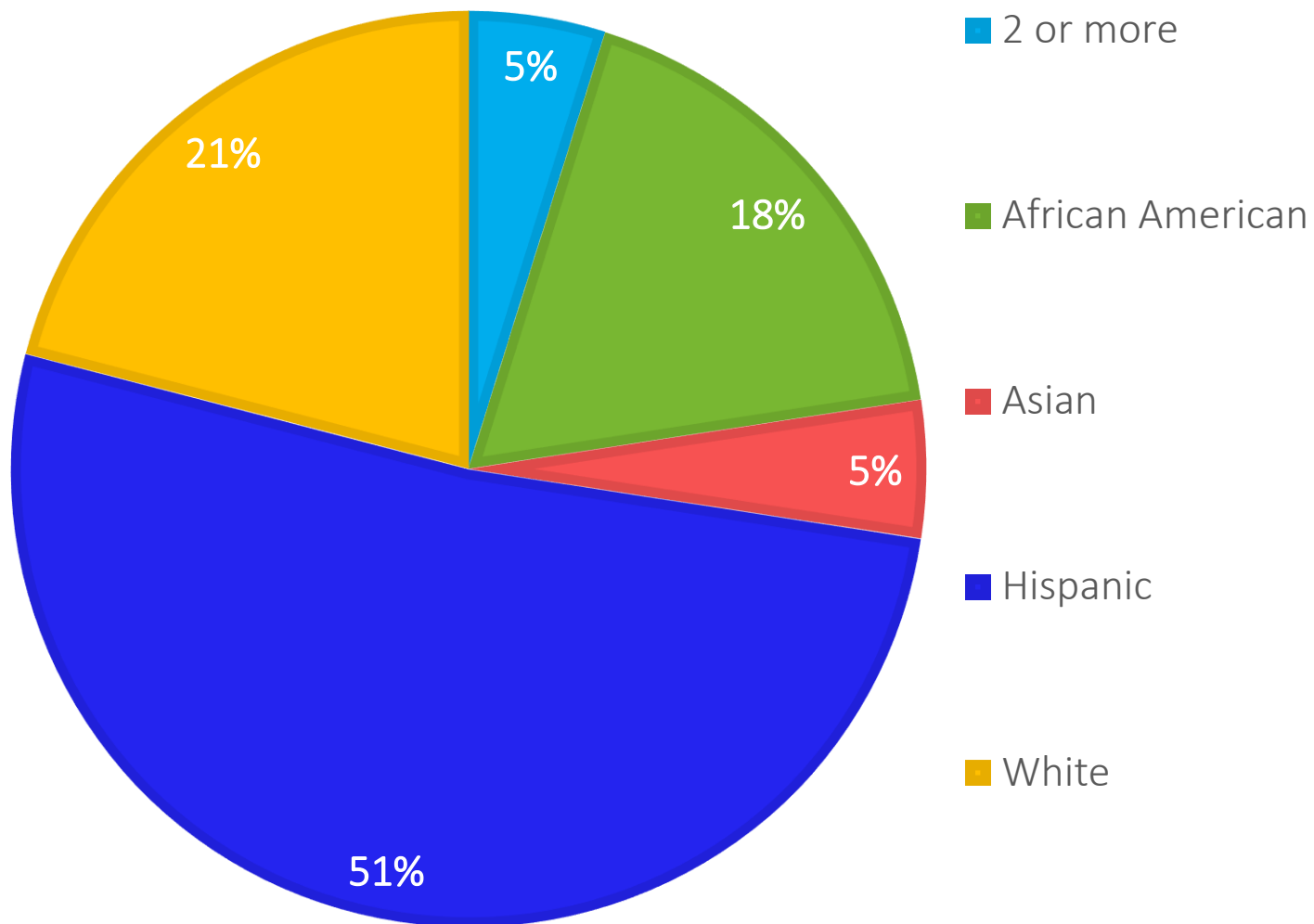





## Cumulative GPAs



## ENTHNICITY







# Course of Study

## BP & AR 6143

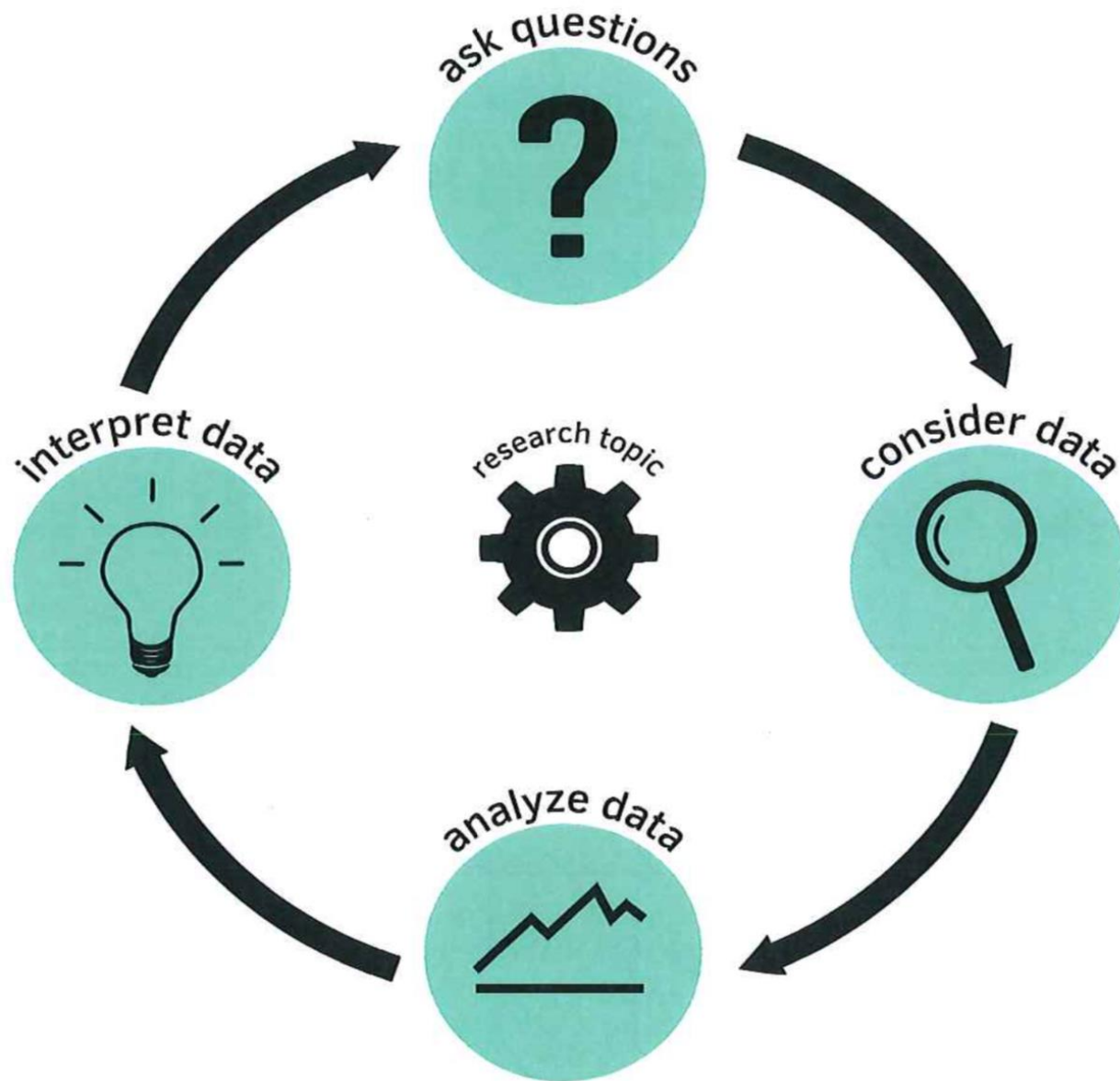
- Updates statistics course to be more relevant to data-driven world. Engages students with real data, introducing statistical, computational, and graphical tools for reasoning about the world.  
“Students as researchers”
- Meets A-G requirements in CA
- Gain access to emerging fields that include Computational Data Analysis
- Uses RStudio, an open-source programming language that is the standard for academic statisticians and analysts in industry



# Standards-Alignment

- The standards used for IDS curriculum are based on the High School Probability and Statistics CA Standards and include the Standards for Mathematical Practice.
- The K-12 Computer Science Standards are consulted and incorporated (CSTA).
- Applied Computational Thinking Standards (ACT) delineate the application of Data Science concepts in using technology.
- Intro to sampling error and bias. Use of Participatory Sensing that emphasizes the involvement of citizens and community groups in the process of sensing and documenting data.

# The Data Cycle



# Are Smokers More Likely To Suffer From Depression?

## Interpret

People that don't smoke are not depressed

- 1 to 2 days = no
- 3 to 5 days = no
- 6 to 9 days = equal
- 10 to 19 days = yes
- 20 to 29 days = yes
- All 30 days = yes

In conclusion it is proven that if you smoke more often you are depressed. One reason for this is because nicotine damages certain pathways in the brain that regulate mood. As a result nicotine may trigger mood swings.

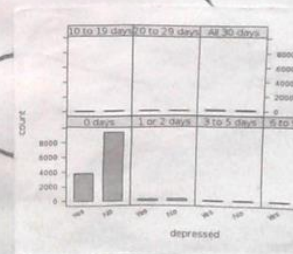
## Consider Data

The data is retrieved from CDC which collected data about teenagers and we will know if depression is likely in students who smoke. Bar graph (~ depressed 1 days - smoking, data tally (~ depressed 1 days - smoking, data = 0)

## Analyze Data

Days smoking						
depressed 0 days	1 or 2 days	3 to 5 days	6 to 9 days	10 to 19 days	20 to 29 days	All 30 days
Yes	3758 (2.1%)	258 (4.2%)	115 (4.9%)	86 (4.4%)	81 (4.0%)	78
No	9497 (1.1%)	312 (2.4%)	130 (2.2%)	85 (1.7%)	88 (1.4%)	58
N/A	79	9	2	2	1	5

Days smoking	
depressed All 30 days	N/A
Yes	1587 (1.8%)
No	164 (1.7%)
N/A	3





# SMMUSD LCAP Goals

- Prepares students for college and job force with quantitative critical thinking skills to be more informed participants in society.
- Access to ELs by focusing on an inquiry-based instructional approach.
- Authentic Assignments:
  - Computer-based labs using RStudio
  - Oral Presentations
  - Design Projects
  - Participatory Sensing Campaigns
  - End-of-Unit Reports
  - Evaluation of Reports based on Data





# Course Materials

- Class set of chrome books
- RStudio and technology package put together in partnership with UCLA
- Students items as specified in the individual lessons to experience simulations, hands-on statistics and probability events.



# Course Costs

## ■ Year 1

- Class set of chrome books
  - \$20,000
- Teacher training and PD support
  - \$6,750
- RStudio, curriculum, and additional resources
  - \$3990 per section (two sections)

## ■ Year 2

- Teacher training and PD support
  - \$3000
- RStudio, curriculum, and additional resources
  - \$3990 per section (two sections)

## ■ Year 3

- RStudio, curriculum, and additional resources
  - \$3990 per section (two sections)



# In the news... #mathequity

“These new approaches have the potential to improve equity and ensure that quantitative literacy is a right, not a privilege.”

-Burdman, Pamela. “A quiet revolt reshaping the pathway to college.” *EDSource*. 9 April 2018.





# In the news... teacher perspective

“It doesn’t matter what they want to be – a nurse, a police officer – data science exposes students to state-of-the-art technology and helps them develop their powers of reasoning. It really does inspire kids.”

- Jones, Carolyn. “‘Big data’ classes a big hit in California high schools.” *EDSource*. 19 February 2018.



# In the news...

## career ready and social justice

Besides predicting habits and behaviors, “...data science is useful in other fields, as well. Economists, lawyers, engineers and medical researchers use data science to study everything from workplace discrimination trends to safety in self-driving cars to genome research.”

- Jones, Carolyn. ““Big data’ classes a big hit in California high schools.” *EDSource*. 19 February 2018.



project-based learning

21st Century Skills  
quantitative literacy

critical thinking

data awareness

positive attitudes coding

engaging

data analysis

inquiry-based

students as researchers