Data Science Foundations Critical Areas of Focus-DRAFT

Ohio's Learning Standards for Mathematics include descriptions of the Conceptual Categories. The critical areas are designed to bring focus to the standards in each course by describing the big ideas that educators can use to build their high school curriculum and to guide instruction. Each course contains up to six critical areas. This document identifies the clusters and standards that build toward each critical area.

The purpose of this document is to facilitate discussion among teachers and curriculum experts and to encourage coherence in the sequence, pacing and units of study for high school curriculum. Professional learning communities can use the following questions as examples to develop their high school curriculum.

DISCUSSION QUESTIONS

Example 1: Analyze and discuss the content for each high school course's Critical Areas of Focus.

- What are the concepts?
- What are the procedures and skills?
- What are the key mathematical practices?
- What are the relationships students are to make?
- What further information is needed? For example, what does prove mean?
- What are appropriate models for representing this learning?

Example 2: Identify and discuss the connections among the conceptual categories, domains, clusters and standards *within* each course's Critical Areas of Focus.

- What are the relationships among the conceptual categories, domains, clusters and standards?
- Why is each relationship important?
- What are the differences?
- How does the Critical Area of Focus description inform the instruction of the related conceptual categories, domains, clusters and standards?

Example 3: Identify and discuss any connections *across* the Critical Areas of Focus within a course. This information will help create a sequence of units for the course.

Example 4: Compare each Critical Area of Focus to those for the preceding and succeeding courses to become familiar with previous and future learning.

- What understandings does this learning build upon?
- What are the related future understandings?

Example 5: Compare and contrast Ohio's Learning Standards to the current district curriculum.

- What is taught now but not in Ohio's Learning Standards?
- What content is essentially the same? Identify the differences.
- What will be new content for this grade?

Data Science Foundations Critical Areas of Focus-DRAFT

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CRITICAL AREA OF FOCUS #1

Communication and Analysis

Students develop conclusions based on quantitative information and critical thinking. They recognize, make, and evaluate underlying assumptions in estimation, modeling, and data analysis, and then organize and present thoughts and processes using mathematical and statistical evidence. They communicate clear and complete information so their audience can better understand the contextual and quantitative information in a given situation or context. Students demonstrate numerical reasoning orally and in writing as they craft coherent statements and paragraphs.

In the context of real-world applications, students make and investigate mathematical conjectures. They are in the context of real-world applications; students make and investigate mathematical conjectures. They defend and question their conjectures and those of their classmates, precursors to formal proof. Oral and written explanations move beyond procedural descriptions or summaries to include mathematical arguments and rationales. As students listen to others' explanations, they develop their own understandings. **This critical area of focus cross cuts all the other critical areas of focus.**

Standards for Mathematical Practices

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.

This critical area cross cuts all the rest of the standards, so all standards in this document also fall under this crucial area!!!

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #2

Data and Visualizations

Students engage in fundamental notions of data analysis as they gather and analyze real-world data. Using descriptive statistics, students gain experience managing large, real-world datasets—a practice too often overlooked in traditional mathematics courses at the secondary level. An emphasis is placed on creating and interpreting visualizations of real-world processes using computational tools.

MATHEMATICS

Standards for Mathematical Practices

3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.

Number and Quantity – Quantities

Reason quantitatively and use units to solve problems.

N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★

N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.★

N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★

Number and Quantity – Vector and Matrix Quantities

Perform operations on matrices, and use matrices in applications.

(+) **N.VM.6** Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

Algebra – Creating Equations

Create equations that describe numbers or relationships.

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions.* ★

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★

A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*★ (A1, M1)

A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.★

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #2, CONTINUED

Data and Visualizations

MATHEMATICS

Algebra – Reasoning with Equations and Inequalities

Represent and solve equations and inequalities graphically.

A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

Statistics and Probability – Interpreting Categorical and Quantitative Data

Summarize, represent, and interpret data on a single count or measurement variable.

S.ID.1 Represent data with plots on the real number line (dot plots[G], histograms, and box plots) in the context of real-world applications using the GAISE model.★

S.ID.2 In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviation[G], interquartile range[G], and standard deviation) of two or more different data sets. ★

S.ID.3 In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★

Summarize, represent, and interpret data on two categorical and quantitative variables.

S.ID.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.★

S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions, or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* (A2, M3)

b. Informally assess the fit of a function by discussing residuals. (A2, M3)

c. Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)

Statistics and Probability – Making Inferences and Justifying Conclusions

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.6 Evaluate reports based on data.★

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Data and Analysis

Data Collection and Storage

DA.DCS.9-12.F.a Analyze patterns in a real-world data store through hypothesis, testing and use of data tools to gain insight and knowledge.

DA.DCS.9-12.F.b Investigate data storage systems to compare and contrast how data is stored and accessed.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #2, CONTINUED

Data and Visualizations

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Data and Analysis

Visualization and Communication

DA.VC.9-12.F.a Analyze the benefits and limitations of data visualization or multisensory artifacts and tools to communicate which is most appropriate to solve a real-world problem.

Inference and Modeling

DA.IM.9-12.F.a Evaluate a model by creating a hypothesis, testing it and refining it to discover connections and trends in the data.

Computer Science 9-12 Foundational Level – Algorithmic Thinking and Programming

Algorithms

ATP.A.9-12.F.b Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.

Control Structures

ATP.CS.9-12.F.b Use appropriate syntax to create and use a method.

ATP.CS.9-12.F.c Use data scoping to isolate data.

Modularity

ATP.M.9-12.F.a Break down a solution into procedures using systematic analysis and design.

Equivalent to: ATP.A.9-12.F.b Define and implement an algorithm by decomposing problem requirements from a problem statement to solve a problem.

ATP.M.9-12.F.b Create computational artifacts by systematically organizing, manipulating and/or processing data.

Computer Science 9-12 Advanced Level – Data and Analysis

Data Collection and Storage

DA.DCS.9-12.A.b Investigate data storage and collection tools to analyze tradeoffs and limitations.

Visualization and Communication

DA.VC.9-12.A.a Create visualization or multisensory artifacts to communicate insights and knowledge gained from complex data analysis that answers real-world questions.

Computer Science 9-12 Advanced Level – Algorithmic Thinking and Programming

Control Structures

ATP.CS.9-12.A.a Write programs that use library methods and control structures and methods to solve a problem.

Modularity

ATP.M.9-12.A.a Construct solutions to problems using student created components (e.g., procedures, modules, objects).

Equivalent to: ATP.CS.9-12.F.b Use appropriate syntax to create and use a method.

ATP.M.9-12.A.c Create programming solutions by reusing existing code (e.g., libraries, Application Programming Interface (APIs), code repositories).

Equivalent to: ATP.CS.9-12.A.a Write programs that use library functions, methods and control structures to solve a problem.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #3

Distributions, Probability, and Simulations

Students generate data using simulations—often of their own design. Then they use numerical summaries to describe the resulting distributions. They additionally use simulations for informal inference using generated probabilities—an approach not typically encountered in traditional courses. This approach scaffolds student computational thinking by allowing students to observe and create models in the process of applying fundamental programming structures.

MATHEMATICS

Standards for Mathematical Practices

4. Model with mathematics.

5. Use appropriate tools strategically.

Number and Quantity – Quantities

Reason quantitatively and use units to solve problems.

N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★

N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.★

N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★

Statistics and Probability – Interpreting Categorical and Quantitative Data

Summarize, represent, and interpret data on a single count or measurement variable.

S.ID.2 In the context of real-world applications by using the GAISE model, use statistics appropriate to the shape of the data distribution to compare center (median and mean) and spread (mean absolute deviation[G], interquartile range[G], and standard deviation) of two or more different data sets. ★

S.ID.3 In the context of real-world applications by using the GAISE model, interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). ★

S.ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. ★

Summarize, represent, and interpret data on two categorical and quantitative variables.

S.ID.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.★

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #3, CONTINUED

Distributions, Probability, and Simulations

MATHEMATICS

Statistics and Probability – Making Inferences and Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments.

S.IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*★

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.6 Evaluate reports based on data.★

Statistics and Probability –Conditional Probability and the Rules of Probability

Understand independence and conditional probability, and use them to interpret data.

S.CP.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").★

S.CP.4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.*★

S.CP.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*★

Statistics and Probability – Using Probability to Make Decisions

Use probability to evaluate outcomes of decisions.

S.MD.7 Analyze decisions and strategies using probability concepts, e.g., product testing, medical testing, pulling a hockey goalie at the end of a game.★

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Data and Analysis

Data Collection and Storage

DA.DCS.9-12.F.a Analyze patterns in a real-world data store through hypothesis, testing and use of data tools to gain insight and knowledge.

DA.DCS.9-12.F.b Investigate data storage systems to compare and contrast how data is stored and accessed.

Computer Science 9-12 Foundational Level – Algorithmic Thinking and Programming

Control Structures

ATP.CS.9-12.F.b Use appropriate syntax to create and use a method.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #3, CONTINUED

Distributions, Probability, and Simulations

COMPUTER SCIENCE

Computer Science 9-12 Advanced Level – Algorithmic Thinking and Programming

Control Structures

ATP.CS.9-12.A.a Write programs that use library methods and control structures and methods to solve a problem.

Modularity

ATP.M.9-12.A.a Construct solutions to problems using student created components (e.g., procedures, modules, objects).

Equivalent to: ATP.CS.9-12.F.b Use appropriate syntax to create and use a method.

ATP.M.9-12.A.c Create programming solutions by reusing existing code (e.g., libraries, Application Programming Interface (APIs), code repositories).

Equivalent to: ATP.CS.9-12.A.a Write programs that use library functions, methods and control structures to solve a problem.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #4

Data Collection Methods: Traditional and Modern

Students extend their knowledge of data collection as they investigate the effects that various methods have on the interpretation of patterns they discover. Moreover, they explore sampling error and bias, and discuss approaches to mitigating their impact on the analysis process and outcomes. This course also introduces students to modern data collection methods, such as participatory sensing[G], using mobile devices, and web services to systematically explore interesting aspects of their worlds ranging from health to culture.

MATHEMATICS

Standards for Mathematical Practices

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

Number and Quantity – Quantities

Reason quantitatively and use units to solve problems.

N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★

N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.★

N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★

Statistics and Probability – Making Inferences and Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments.

S.IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.★

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.★

S.IC.6 Evaluate reports based on data.★

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #4, CONTINUED

Data Collection Methods: Traditional and Modern

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Algorithmic Thinking and Programming

Variables and Data Representation

(+)ATP.VDR.9-12.F.a Identify types of variables and data and utilize them to create a computer program that stores data in appropriate ways.

Computer Science 9-12 Foundational Level – Impacts of Computing

Social Interactions

IC.SI.9-12.F.b Analyze the collection and generation of data through automated processes to explain the privacy concerns that are not always evident to users.

Safety, Law and Ethics

IC.SLE.9-12.F.c Analyze the collection and generation of data through automated processes to explain the legal concerns that are not always evident to users.

Computer Science 9-12 Advanced Level – Data and Analysis

Data Collection and Storage

DA.DCS.9-12.A.a Create multidimensional data collections that can be utilized through various methods to solve complex data problems.

Computer Science 9-12 Advanced Level – Algorithmic Thinking and Programming

Algorithms

ATP.A.9-12.A.d Use sorting and searching to analyze and organize data

Variables and Data Representation

ATP.VDR.9-12.A.a Utilize different data storage structures to store larger and more complex data than variables can contain.

ATP.VDR.9-12.A.b Identify the appropriate data structures or variables to use to design a solution to a complex problem.

Control Structures

ATP.CS.9-12.A.a Write programs that use library methods and control structures and methods to solve a problem.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #5

Predictions and Models

Students create and apply mathematical and statistical models to predict future observations and investigate how data scientists measure the success of these predictions. This is done by identifying, analyzing, and implementing efficient steps in the process of regression analysis. Learners design and develop models based on real-world data, evaluating the usefulness of the models in the context of the problem or situation. Students engage in ongoing reflection during the modeling and testing phases as they further develop and strengthen their metacognitive skills.

MATHEMATICS

Standards for Mathematical Practices

2. Reason abstractly and quantitatively.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.

Number and Quantity – Quantities

Reason quantitatively and use units to solve problems.

N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★

N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.★

N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★

Functions – Interpreting Functions

Understand the concept of a function, and use function notation.

F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f(x)*.

F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Interpret functions that arise in applications in terms of the context.

F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★ (A2, M3)

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #5, CONTINUED

Predictions and Models

MATHEMATICS

Functions – Interpreting Functions

Interpret functions that arise in applications in terms of the context.

F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★
c. Emphasize the selection of a type of function for a model based on behavior of data and context. (A2, M3)

F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★ (A2, M3)

Analyze functions using different representations.

F.IF.7 Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.★

Functions – Building Functions

Build a function that models a relationship between two quantities.

F.BF.1 Write a function that describes a relationship between two quantities.★
a. Determine an explicit expression, a recursive process, or steps for calculation from context.
b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.* (A2, M3)
(+) **c.** Compose functions. *For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.*

Functions – Linear, Quadratic, and Exponential Models

Construct and compare linear, quadratic, and exponential models, and solve problems.

F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.★

F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).★

Interpret expressions for functions in terms of the situation they model.

F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.★

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #5, CONTINUED

Predictions and Models

MATHEMATICS

Geometry – Modeling with Geometry

Apply geometric concepts in modeling situations.

G.MG.3 Apply geometric methods to solve design problems, e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios.★

Statistics and Probability – Interpreting Categorical and Quantitative Data

Summarize, represent, and interpret data on two categorical and quantitative variables.

S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions, or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* (A2, M3)

b. Informally assess the fit of a function by discussing residuals. (A2, M3)

c. Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)

Interpret linear models.

S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.★

S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.★

S.ID.9 Distinguish between correlation and causation.★

Statistics and Probability – Making Inferences and Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments.

S.IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*★

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.6 Evaluate reports based on data.★

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Data and Analysis

Data Collection and Storage

DA.DCS.9-12.F.b Investigate data storage systems to compare and contrast how data is stored and accessed.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #5, CONTINUED

Predictions and Models

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Data and Analysis

Inference and Modeling

DA.IM.9-12.F.a Evaluate a model by creating a hypothesis, testing it and refining it to discover connections and trends in the data.

Computer Science 9-12 Foundational Level – Algorithmic Thinking and Programming

Algorithms

ATP.A.9-12.F.a Define and use appropriate problem solving strategies and visual artifacts to create and refine a solution to a real world problem.

Control Structures

ATP.CS.9-12.F.a Define control structures and Boolean logic and use them to solve real-world scenarios.

Computer Science 9-12 Advanced Level – Data and Analysis

Inference and Modeling

DA.IM.9-12.A.a Create a model that simulates a complex system and uses extracted data to hypothesize, test and refine the model to discover connections or trends.

Computer Science 9-12 Advanced Level – Algorithmic Thinking and Programming

Algorithms

ATP.A.9-12.A.a Define and explain recursive algorithms to understand how and when to apply them.

ATP.A.9-12.A.b Use recursion to effectively solve problems.

Control Structures

ATP.CS.9-12.A.a Write programs that use library methods and control structures and methods to solve a problem.

Modularity

ATP.M.9-12.A.b Design or redesign a solution to a large-scale computational problem by identifying generalizable patterns.

Data Science Foundations Critical Areas of Focus

CRITICAL AREA OF FOCUS #6

Data and Society

As our world becomes increasingly interconnected with technology, nearly every facet of modern life is impacted by data. Individuals and communities influence computing through their behaviors and cultural and social interactions. Likewise, computing influences new cultural practices. Informed and responsible citizens should understand the social implications of the digital world, including equity and access to computing (K-12 Computer Science Framework (K12CSF), p. 92). Students enrolled in this course learn how data impacts equity, privacy, security, legal, and ethical issues.

MATHEMATICS

Standards for Mathematical Practices

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.

Number and Quantity – Quantities

Reason quantitatively and use units to solve problems.

N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. ★

N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.★

N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★

Statistics and Probability – Using Probability to Make Decisions

Use probability to evaluate outcomes of decisions.

S.MD.7 Analyze decisions and strategies using probability concepts, e.g., product testing, medical testing, pulling a hockey goalie at the end of a game.★

COMPUTER SCIENCE

Computer Science 9-12 Foundational Level – Impacts of Computing

Culture

IC.Cu.9-12.F.b Explore other professions to understand how computing has and will impact them positively and negatively.

Social Interactions

IC.SI.9-12.F.b Analyze the collection and generation of data through automated processes to explain the privacy concerns that are not always evident to users.

Computer Science 9-12 Foundational Level – Impacts of Computing

Culture

IC.Cu.9-12.A.b Analyze the equity, access and influence of the distribution of computing resources to see their global impact.

Safety, Law and Ethics

IC.SLE.9-12.F.c Analyze the collection and generation of data through automated processes to explain the legal concerns that are not always evident to users.