NGSS Content Standards with Related GAISE II Concepts

Middle School and High School

Middle School

NGSS MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.B.3** Understand that data can be used to make comparisons between different groups at one point in time and the same group over time

NGSS MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- Formulate Statistical Investigative Questions I.A.1 Understand when a statistical investigation is appropriate
- **Formulate Statistical Investigative Questions I.B.3** Pose summary, comparative, and association statistical investigative questions about a broader population using samples taken from the population

NGSS MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.B.7** Understand that data can be collected (primary data) or existing data can be obtained from other sources (secondary data)
- **Analyze the Data III.B.3** Use reasoning about distributions to compare two groups based on quantitative variables

NGSS MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Formulate Statistical Investigative Questions I.B.4** Pose statistical investigative questions that require looking at a variable over time

NGSS MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.B.3** Use reasoning about distributions to compare two groups based on quantitative variables

NGSS MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Interpret Results IV.A.1** Use statistical evidence from analyses to answer the statistical investigative questions and communicate results through structured answers with teacher guidance

NGSS MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.B.1** Represent the variability of quantitative variables using appropriate displays (e.g., dotplots, boxplots)

NGSS MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.B.7** Understand that data can be collected (primary data) or existing data can be obtained from other sources (secondary data)

NGSS MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.B.3** Understand that data can be used to make comparisons between different groups at one point in time and the same group over time

NGSS MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. [Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Interpret Results IV.A.1** Use statistical evidence from analyses to answer the statistical investigative questions and communicate results through structured answers with teacher guidance

NGSS MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.B.2** Learn to use the key features of distributions for quantitative variables, such as: ° center: mean as a balance point, and median as the middle-ordered value ° variability: interquartile range and mean absolute deviation (MAD) ° shape: symmetric or asymmetric and number of modes

NGSS MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- Formulate Statistical Investigative Questions I.A.2 Pose statistical investigative questions of interest to students where the context is such that students can collect or have access to all required data

High School

NGSS HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Interpret Results IV.C.4** Interpret the margin of error associated with an estimate of a population characteristic

NGSS HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.A.5** Observe whether there appears to be an association between two variables
- **Analyze the Data III.C.3** Summarize and describe relationships among multiple variables

NGSS HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.C.8** Use simulations to investigate associations between two categorical variables and to compare groups

NGSS HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.C.8** Use simulations to investigate associations between two categorical variables and to compare groups

NGSS HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Formulate Statistical Investigative Questions I.C.1** Formulate multivariable statistical investigative questions and determine how data can be collected and analyzed to provide an answer

NGSS HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Analyze the Data III.C.8** Use simulations to investigate associations between two categorical variables and to compare groups

NGSS HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Formulate Statistical Investigative Questions I.C.1** Formulate multivariable statistical investigative questions and determine how data can be collected and analyzed to provide an answer
- **Formulate Statistical Investigative Questions I.C.2** Pose summary, comparative, and association statistical investigative questions for surveys, observational studies, and experiments using primary or secondary data

NGSS HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.C.9** Understand that in some circumstances, the data collected or considered may not generalize to the desired population, or this data may be the entire population

NGSS HS-LS4-3 Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Collect Data/ Consider Data II.B.2** Understand that a sample can be used to answer statistical investigative questions about a population. Recognize the limitations and scope of the data collected by describing the group or population from which the data are collected
- **Analyze the Data III.B.1** Represent the variability of quantitative variables using appropriate displays (e.g., dotplots, boxplots)
- **Analyze the Data III.C.3** Summarize and describe relationships among multiple variables
- **Interpret Results IV.C.3** Understand what it means for an outcome or an estimate of a population characteristic to be plausible or not plausible compared to chance variation

NGSS HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Formulate Statistical Investigative Questions I.C.1** Formulate multivariable statistical investigative questions and determine how data can be collected and analyzed to provide an answer

NGSS HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Related GAISE II concepts that can be addressed while focused on this NGSS standard:

- **Formulate Statistical Investigative Questions I.C.1** Formulate multivariable statistical investigative questions and determine how data can be collected and analyzed to provide an answer