

Table 2. Connecting to the Next Generation Science Standards

<p>Designing learning experiences to investigate the COVID-19 pandemic in science classrooms exposed gaps in the science concepts currently included in the Next Generation Science Standards (NGSS). Science concepts useful for navigating public health emergencies are largely absent from the standards. Below we suggest NGSS connections to teach COVID-19 in the context of a Molecules to Organisms unit. Other connections are possible.</p>
Performance Expectations
<p>HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>
Science and Engineering Practices
<p>Developing and Using Models</p> <ul style="list-style-type: none">● Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none">● Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.● Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. <p>Obtaining, Evaluating, and Communicating Information.</p> <ul style="list-style-type: none">● Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (i.e., orally, graphically, textually, mathematically).
Disciplinary Core Ideas
<p>In this unit, students build toward the following DCI elements:</p> <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none">● Systems of specialized cells within organisms help them perform the essential functions of life.● All cells contain genetic information in the form of DNA molecules. Genes are regions

in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.

- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

Crosscutting Concepts

Patterns

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.
- Mathematical representations are needed to identify some patterns.

Cause and Effect

- Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.

Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).