Bristol Public Schools

Office of Teaching & Learning

Department	Science
Department Philosophy	Bristol Public Schools science programing provides students with knowledge of the science and engineering practices, crosscutting concepts, and the core ideas of science and engineering to engage in public discussions on science related issues, to be critical consumers of scientific information related to their everyday lives, and continue to learn science throughout their lives. To ensure this level of scientific literacy, Bristol Public Schools anchor science units in phenomena, this practice promotes student ownership of learning and supports student application of the science content as it pertains to the real world. In each science unit, students work to explain phenomena through the applications of the three dimensions of the Next Generation Science Standards: (1) science and engineering practices, (2) disciplinary core ideas, and (3) cross cutting concepts. Bristol's use of phenom-based units and the three dimensions ensure that students connect with and build a deep conceptual understanding of science concepts. Throughout the kindergarten through grade 12 experience, this philosophy provides all Bristol students with the skills and concepts to be scientifically literate adults.
Course	Anatomy and Physiology
Course Description for Program of Studies	The anatomy and physiology course is designed for students who plan to enter a health-related career or have an interest in a more extensive exploration of human anatomy. The relationship between structures and their functions is emphasized and examined through the use of models, preserved animals or their organs. Students who wish to earn accelerated credit will have the opportunity to by completing independent extensions to their learning and assessments.
Grade Level	11-12
Pre-requisites	Passed or taken concurrently with Biology
Credit (if applicable)	Challenge by Choice Designation-ACA or ACC by student choice.

District Learning Expectations and Standards

NGSS Standards and Dimensions

UNIT 1-Scientific Literacy and Communication

UNIT 1-Organization of the Human Body

UNIT 1-Cellular Metabolism

District Learning Expectations and Standards	1	2	3	4	5	6	7	8	9	10	11	12	13	14
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.		X	X	X			X	X				X		
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.		X				X						X		
HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.			X					X			X		X	
Nature of Science (SEP-related) These understandings about the nature of science are closely associated with the science and engineering practices	X	X	X							X			X	X
SEP-Developing and Using Models A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.			X	X	X					X			X	X
SEP-Planning and Carrying Out Investigations Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.	X													
SEP-Constructing Explanations and Designing Solutions The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.	X	X		X									X	X
SEP-Obtaining, Evaluating and Communicating Information Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.	X	X			X	X			X	X				
CCC-Systems and System Models		X						X						

A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.														
CCC-Structure and Function The way an object is shaped or structured determines many of its properties and functions.		X	X	X	X	X				X			X	
CCC-Stability and Change For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.			X											

NGSS Standards and Dimensions

UNWRAPPED STANDARDS

Standard		Dimensions of the NGSS Standard	Concepts and Disciplinary-Specific Vocabulary	Academic Vocabulary
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**SEP**	**Developing and Using Models** ● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.	● Conceptual, multicellular, nutrient, organic matter, inorganic matter, specialized, structural, tissue, anatomical characteristic, derive, destabilize, enzyme, feedback mechanism, hierarchical, homeostasis, neural, regulate	● Model, relationship, organism
	DCI	**LS1.A: Structure and Function** ● 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.		
	CCC	**Systems and System Models** ● Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.		
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	**SEP**	**Planning and Carrying Out Investigations** ● Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.	● Conceptual, multicellular, nutrient, organic matter, inorganic matter, specialized, structural, tissue, anatomical characteristic, derive, destabilize, enzyme, feedback mechanism, hierarchical, homeostasis, neural, regulate	● Investigation, variable independent variable, dependent variable, constant, control, data, reliable , quantitative, qualitative, measurement, hypothesis
	DCI	**LS1.A: Structure and Function** ● 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.		
	CCC	**Stability and Change** ● Feedback (negative or positive) can stabilize or destabilize a system.		
HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and	**SEP**	**Developing and Using Models** ● Use a model based on evidence to illustrate the	● Carbon, chemical process, chemical reaction,	● Model, revise, refine, relationships, connections, energy,

oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.		relationships between systems or between components of a system.	interdependent, molecule, nutrient, protein, amino acid, biological molecule, chemical equation, compound, hydrocarbon, hydrogen,	transfer
	DCI	**LS1.C: Organization for Matter and Energy Flow in Organisms** ● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. ● As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.		
	CCC	**Energy and Matter** ● Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.		
Nature of Science (SEP-related) These understandings about the nature of science are closely associated with the science and engineering practices	**NoS**	● Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.	● Theory, empirical evidence, evaluate, natural system, patterns, argument, investigation, technology, discourse, precision, accuracy	●
	NoS	● Science knowledge is based on empirical evidence. ● Science disciplines share common rules of evidence used to evaluate explanations about natural systems. ● Science includes the process of coordinating patterns of evidence with current theory. ● Science arguments are strengthened by multiple lines of evidence supporting a single explanation.		
	NoS	● Science investigations use diverse methods and do not always use the same set of procedures to obtain data. ● New technologies advance scientific knowledge. ● Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings. ● The discourse practices of science are organized around disciplinary domains that share examples for making decisions regarding the values, instruments, methods, models, and evidence to adopt and use. ● Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.		
Science and Engineering Practices: **Developing and Using Models** A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and	**SEP**	● 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.	● Model , system, components, mechanistic, analysis, analyze, computational, phenomenon	● Revise, illustrate, predict, relationship

explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.	**SEP**	● Use a model to provide mechanistic accounts of phenomena.		
	SEP	● Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.		
Science and Engineering Practices: **Planning and Carrying Out Investigations** Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.	**SEP**	● Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible variables or effects and evaluate the confounding investigation's design to ensure variables are controlled.	● Investigation, design, test, data collection, phenomenon, variables, confounding, evaluate, directional hypothesis, manipulated variable	●
	SEP	● Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.		
	SEP	● Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.		
Science and Engineering Practices: **Constructing Explanations and designing Solutions** The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.	**SEP**	● Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.	● Quantitative, qualitative, relationship, scientific reasoning, evidence, simulation	● construct/revise, theory, law
	SEP	● Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.		
	SEP	● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.		
Science and Engineering Practices: **Obtaining, Evaluating and Communicating Information** Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences	**SEP**	● Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	● Evidence, integrate, media, format, scientific question,	● Model, information, paraphrase, solve, communicate, graphically, mathematically

and progresses to evaluating the validity and reliability of the claims, methods, and designs.	**SEP**	• 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.		
	SEP	• 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 (including orally, graphically, textually, and mathematically).		
Crosscutting Concepts: **Systems and System Models** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.	**CCC**	• Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.	• Physical model, computational model, mater flow, scale, system, investigate, precision, reliability, input, output, conditions	• assumption, conditions, approximations, inherent
	CCC	• Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.		
	CCC	• When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.		
Crosscutting Concepts: **Structure and Function** The way an object is shaped or structured determines many of its properties and functions.	**CCC**	• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.	• Properties, components, conditions, function, natural, designed, molecular substructure,	•
	CCC	• The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.		
Crosscutting Concepts: **Stability and Change** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.	**CCC**	• Feedback (negative or positive) can stabilize or destabilize a system.	• Feedback mechanism, feedback loop, positive feedback, negative feedback, stable	•
	CCC	• Much of science deals with constructing explanations of how things change and how they remain stable.		

UNIT 1-Scientific Literacy and Communication

Unit Essential Questions:
- How is scientific knowledge created and communicated?

<table>
<tr><th>Learning Sequence</th><th>Student Learning Target(s): I can...</th><th>Summative Assessment Strategy</th><th>Connection to the NGSS Dimensions</th><th>Common Learning Experiences</th></tr>
<tr>
<td>(1)
Scientific Inquiry</td>
<td>

I can identify questions that can be answered through scientific investigation.
I can design and conduct appropriate types of scientific investigations to answer different questions.
I can formulate a testable hypothesis and demonstrate logical connections between scientific concepts guiding the hypothesis and design of the experiment.

Academic Vocabulary:
Experiment, factor, hypothesis, investigation, observation, prediction, test, variable, experimental design
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<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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SEP | DCI | CCC

Science investigations use diverse methods and do not always use the same set of procedures to obtain data.
Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.
Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

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Scientific Variable Review POGIL-Part 1

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<tr>
<td>(2)
Scientific Literacy</td>
<td>

I can identify independent and dependent variables, including those that are kept constant and those used as controls.
I can use appropriate tools and techniques to make observations and gather data.
I can read, interpret and examine the credibility and validity of scientific claims in different sources of information.
I can articulate conclusions and explanations based on results of the research, and assess the validity based on the design of the investigation.

Academic Vocabulary:
Independent variable, dependent variable, control group, constant, gather, observe, obtain, study, mitigate, quantify, clarify, convey, present, synthesize, reliable
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<td>
<table>
<tr><td>x</td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table>
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<td>
SEP | DCI | CCC

Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.
Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

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Scientific Variable Review POGIL-Part 2
Data analysis activity

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</table>

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<tr>
<td>(3)
Scientific Numeracy</td>
<td>

I can communicate about science in different formats, using relevant science vocabulary, supporting evidence, and clear logic.
I can assess the reliability of the data that was generated in the investigation
I can use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms

Academic Vocabulary:
Evidence, computational, mathematical, statistical, accurate, analysis, assumption, data, finding, inference, qualitative, quantitative
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<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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<td>
SEP | DCI | CCC

Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development 00and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).
Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

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Scientific Variable Review POGIL-Part 3
Data analysis activity

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<tr>
<td colspan="3">Challenge by Choice Assessment Options</td>
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Unit 1 Base Assessment (ACA-only):
ACC Assessment Add-on:Unit 1 ACCELERATED Extension

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UNIT 1-Organization of the Human Body

Unit Narrative: Unit one is the foundation that each unit will build on. The focus is on homeostasis and body organization from micro to macro. Students will build upon prior learning of feedback mechanisms in living systems and apply that specifically to the human body maintaining homeostasis.

Unit Essential Questions:
- How is the human body organized?
- How is homeostasis regulated in humans?
- What happens if homeostasis is disrupted?
- How are anatomical terms used to describe relative positions, sections, and regions?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Maintenance of Life	• I can explain homeostasis and its importance to survival. • I can describe a homeostatic mechanism. **Academic Vocabulary:** anatomy, physiology, atoms, molecules,macromolecule, cell, organelle, tissue, organ, organ system, organism, metabolism, movement, responsiveness, growth, reproduction, digestion, absorption, circulation, assimilation, excretion, homeostasis, homeostatic mechanism, receptors, set point, effectors, negative feedback,	[ ] Selected Response [x] Constructed Response [ ] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • 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.	• Feedback Mechanism Modeling
(2) Organization of the Human Body	• I can explain how body organization provides a beginning for the study of Anatomy and physiology. • I can describe the location of the major body cavities and identify the organs in each. • I can use appropriate terminology to describe body parts. **Academic Vocabulary:** anatomy, physiology, atoms, molecules,macromolecule, cell, organelle, tissue, organ, organ system, organism, axial, appendicular, cranial cavity, vertebral cavity, thoracic cavity, abdominopelvic cavity, viscera, diaphragm, parietal membrane, visceral membrane, pleural membranes, pericardium membranes, peritoneal membranes, heart, lungs, brain, spinal cord, stomach, liver, spleen,	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • 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. • Science disciplines share common rules of evidence used to evaluate explanations about natural systems. • 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 (including orally, graphically, textually, and mathematically). • When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs	• Body Organization Lab

<table>
<tr><td></td><td>gallbladder, intestines, ovaries/ testes, uterus, bladder, kidneys</td><td></td><td colspan="3">and outputs analyzed and described using models.</td><td></td></tr>
<tr><td>(3)
Anatomical Terminology</td><td>● I can utilize the terms that describe relative positions, body secretions and regions.
● I can use appropriate terminology to describe body part location.

Academic Vocabulary:
Anatomical position, superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial, deep, sagittal, transverse, coronal, body regions</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>SEP</td><td>DCI</td><td>CCC

● Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.
● The discourse practices of science are organized around disciplinary domains that share examples for making decisions regarding the values, instruments, methods, models, and evidence to adopt and use.</td><td>● Body Organization Lab</td></tr>
<tr><td colspan="5">Challenge by Choice Assessment Options</td><td>● Unit Base Assessment (ACA-only):
● ACC Assessment Add-on: Unit 1 ACCELERATED Extension</td></tr>
</table>

UNIT 1-Cellular Metabolism

Unit Narrative: Unit one is the foundation that each unit will build on. The focus is on homeostasis and body organization from micro to macro. Students will build upon prior learning of feedback mechanisms in living systems and apply that specifically to the human body maintaining homeostasis.

Unit Essential Questions:
- Why are organic and inorganic compounds important in cells?
- How do cells, tissues, and organs interact to form organ systems?
- How do substances get into and out of cells?
- How are organic compounds used by cells?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Chemical Constituents of Cells	• I can describe the functions of various types of organic and inorganic chemicals in cells. • I can model and describe the three types of chemical reactions. **Academic Vocabulary:** Macromolecules, carbohydrates, lipids, proteins, nucleic acids, receptors, antibodies, amino acids, enzymes, catalyst, organic, inorganic, synthesis reaction, decomposition reaction, exchange reaction		**SEP** / **DCI** / **CCC** • As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. • Much of science deals with constructing explanations of how things change and how they remain stable.	• Model-Chemical Reactions in the Body
(2) Cell Structure	• I can explain how the structure of the cell is related to its function. • I can explain how cells connect and interact forming tissues, organs and organ systems. **Academic Vocabulary:** Cell membrane, nucleus, cytoplasm, organelles,selectively permeable,diffusion, equilibrium, facilitated diffusion, osmosis, isotonic, hypertonic, hypotonic		**SEP** / **DCI** / **CCC** • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. • 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.	• CER-Cell Structure and Function
(3)	• I can model how substances move through		**SEP** / **DCI** / **CCC**	• Model-Movement through Cell

	Selected Response
x	Constructed Response
	Performance
	Observation

Movements through cell membranes	cell membranes. ● I can describe the utilization and movement of carbohydrates, lipids and proteins in a cell. **Academic Vocabulary:** Cell membrane, cytoplasm,selectively permeable,diffusion, equilibrium, facilitated diffusion, osmosis, isotonic, hypertonic, hypotonic, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	● Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory. ● Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.	Membranres
Challenge by Choice Assessment Options				● Unit 1 Base Assessment (ACA-only): ● ACC Assessment Add-on:Unit 1 ACCELERATED Extension

UNIT 2: Nervous System

Unit Narrative: The nervous system is the major controlling, regulatory, and communicating system in the body. It is the center of all mental activity including thought, learning, and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis. Through its receptors, the nervous system keeps us in touch with our environment, both external and internal. This unit includes a mammalian brain dissection to analyze structure and how that relates to function.

Unit Essential Questions:

- What is the anatomy and physiology of a response?
- What are the functions of the nervous system?
- What are the functions of the major areas of the brain?
- How do we receive information about the environment around us?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Neurons and Neuroglial Cells	• I can model and describe the general structure of a neuron. **Academic Vocabulary:** Neurons, nerve impulses, cell body, dendrites, axons, nerves, neuroglial cells, Central Nervous System, Peripheral nervous system, microglial cells, oligodendrocytes, astrocytes, ependymal cells, schwann cells,myelin, nodes of ranvier	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • 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. • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.	• Neuron structure labeling
(2) Nerve Impulse	• I can describe the events that lead to the conduction of a nerve impulse. • I can explain the ways in which the nervous system processes information. **Academic Vocabulary:** Neurons, nerve impulses, cell body, dendrites, axons, nerves,schwann cells,myelin, nodes of ranvier, cell membrane potential, resting membrane potential, sodium, potassium,threshold potential, depolarization, action potential, repolarization, ion channels, al[l-or-none	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	• Nerve impulse modeling/diagraming
(3) Synapses	• I can explain how information passes from one neuron to another and the role of neurotransmitters.	[ ] Selected Response [x] Constructed Response	**SEP** / **DCI** / **CCC** • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations,	• Reflex Lab

	Academic Vocabulary: Axon, dendrite, Action Potential, Calcium, ion channels, membrane potential, neurotransmitter, synapse, excitatory, inhibitory, vesicles,Presynaptic neuron, post synaptic neuron	x Performance Observation	peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	
(4) Nerve Pathways	• I can model and describe the parts and their function on the reflex arc. **Academic Vocabulary:** Axon, dendrite, Action Potential, Calcium, ion channels, membrane potential, neurotransmitter, synapse, excitatory, inhibitory, vesicles,Presynaptic neuron, post synaptic neuron	Selected Response x Constructed Response x Performance Observation	**SEP** **DCI** **CCC** • The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.	• Reflex Lab
(5) Central Nervous System	• I can model and describe the parts of the brain and the spinal cord and their respective functions. **Academic Vocabulary:** Central Nervous System, Peripheral nervous system, cerebrum, cerebellum, brain stem, midbrain, pons, medulla oblongata, corpus callosum, frontal lobe, parietal lobe, temporal lobe, occipital lobe, meninges, spinal cord, ascending tracts, descending tracts, dura mater, arachnoid mater, pia mater, cerebral spinal fluid, subdural hematoma	Selected Response x Constructed Response x Performance Observation	**SEP** **DCI** **CCC** • 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. • Use a model to provide mechanistic accounts of phenomena.	• Brain Dissection Lab
(6) Peripheral and Autonomic Nervous System	• I can describe the general functions of the peripheral and autonomic nervous systems. **Academic Vocabulary:** Somatic nervous system, autonomic nervous system, cranial nerves, spinal nerves, sympathetic nervous system, parasympathetic nervous system	Selected Response x Constructed Response Performance Observation	**SEP** **DCI** **CCC** • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	
			Challenge by Choice Assessment Options	• Base Assessment (ACA-only):PART 1 Assessment • Part 2 Assessment CNS (Accelerated built in)

	• ACC Assessment Add-on: Unit 2 Accelerated Extension (Part 1)

UNIT 3: Somatic and Special Senses

Unit Narrative: The senses unit builds on the nervous system unit with the understanding of how the cells communicate and applying that to each of the somatic and special senses. Students investigate the structure of each of the special senses and then move into the physiology of each of those senses. This unit includes a mammal eye dissection to review the structure of the eyeball and how structure relates to function.

Unit Essential Questions:
- Where are sensory receptors in our body? Are they everywhere?
- How does one hear?
- How does one see?
- How are visions and movement related?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Somatic Senses	• I can identify the various types of receptors. • I can describe sensory adaptation. • I can distinguish between the various types of somatic senses. **Academic Vocabulary:** Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve endings, meissner's corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, opitc disc, vitreous humor, refraction, rhodopsin	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**SEP** / **DCI** / **CCC** • 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 (including orally, graphically, textually, and mathematically).	• Receptor graphic organizer • Sensory Organ Diagram labeling • Sense physiology sequencing • Eye Dissection Lab
(2) Pain	• I can model and describe how the sense of pain is produced. **Academic Vocabulary:** Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**SEP** / **DCI** / **CCC** • 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.	• Model-Sense of Pain

<table>
<tr><td></td><td>endings, meissner’s corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, opitc disc, vitreous humor, refraction, rhodopsin</td><td></td><td></td><td></td></tr>
<tr><td>(3)
Special Senses</td><td>• I can relate the structure and function of the organs involved with smell, taste, hearing, equilibrium, and sight.

Academic Vocabulary:
Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve endings, meissner’s corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, opitc disc, vitreous humor, refraction, rhodopsin</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td><table><tr><th>SEP</th><th>DCI</th><th>CCC</th></tr></table>• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</td><td>• Sensation Labs
• Eye Dissection Lab</td></tr>
<tr><td colspan="3">Challenge by Choice Assessment Options</td><td>• Base Assessment (ACA-only): Senses Aca Unit Test
• ACC Assessment Add-on: Senses Case Study</td></tr>
</table>

UNIT 4: Endocrine System

Unit Narrative:The Endocrine unit builds on students' learning of the organization of the human body and how cells communicate and rely on feedback mechanisms to maintain homeostasis. Students will begin with the general anatomy and then move into the physiology of the endocrine system.

Unit Essential Questions:
- How are hormones involved in regulating homeostasis?
- How do steroids and nonsteroid hormones differ in their actions on a cell?
- How are hormone secretions controlled?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Steroid and Nonsteroid Hormones	• I can explain how steroid and nonsteroid hormones affect target cells. **Academic Vocabulary:** Steroid hormones, nonsteroid hormones	☐ Selected Response ☒ Constructed Response ☒ Performance ☐ Observation	**SEP** / **DCI** / **CCC** • The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials. • 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 (including orally, graphically, textually, and mathematically).	• Endocrine POGIL • Feedback POGIL • Endocrine Organ Diagram & Model
(2) Control of Secretions	• I can discuss how negative feedback systems regulate hormonal secretions. • I can explain how the nervous system controls secretion. **Academic Vocabulary:** homeostasis, homeostatic mechanism, receptors, set point, effectors, negative feedback, target cells	☐ Selected Response ☒ Constructed Response ☒ Performance ☐ Observation	**SEP** / **DCI** / **CCC** • 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.	• Feedback POGIL
(3) Endocrine Glands	• I can model locations and functions of major endocrine glands. **Academic Vocabulary:**	☐ Selected Response ☒ Constructed Response ☒ Performance	**SEP** / **DCI** / **CCC** • Use a model based on evidence to illustrate the relationships between systems or between components of a system.	• Endocrine glands diagram • Feedback POGIL • Cell Communication POGIL

	Endocrine gland, target cells, hormones, paracrine, autocrine, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, pancreas, pineal gland, thymus gland, ovaries, testes	☐ Observation		
Challenge by Choice Assessment Options				• Base Assessment (ACA-only): Endocrine Assessment Academic • ACC Assessment Add-on: Endocrine System Case Study

UNIT 5: Skeletal System

Unit Narrative: The skeletal system unit builds on student learning of cells and cell differentiation. The unit begins with overall structure and function. The focus is on bone growth and remodeling and for students to gain an understanding of the factors that impact bone development.

Unit Essential Questions:
- How is the body supported and protected?
- Why is bone considered to be a living tissue?
- Why are we so flexible?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Bone	• I can describe the general structure and function of a bone. • I can model and describe the development of bone. • I can identify the major bones of the skeleton and their features. • I can use evidence to explain why bone is a living tissue. **Academic Vocabulary:** appendicular skeleton, axial skeleton, Bones associated with each, Periosteum, compact bone, spongy bone, medullary cavity, endosteum, marrow, osteocytes, intramembranous bones, endochondral bones, osteoblasts, epiphyseal plate, osteoclasts	☐ Selected Response x Constructed Response x Performance ☐ Observation	**SEP** / **DCI** / **CCC** • Use a model based on evidence to illustrate the relationships between systems or between components of a system. • 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.	• Skeletal system structure labeling • Bone tissue formation sequencing activity
(2)	• I can describe and locate the various types		**SEP** / **DCI** / **CCC**	• Joint Model/ demonstration

<table>
<tr>
<td>Joints</td>
<td>of joints.

Academic Vocabulary:
Joints, fibrous joints, cartilaginous joints, synovial joints, menisci, bursae, ball and socket joints, condyloid joints, gliding joints, hinge joint, pivot joint, saddle joint</td>
<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table>
</td>
<td>

Use a model based on evidence to illustrate the relationships between systems or between components of a system.
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.

</td>
<td></td>
</tr>
<tr>
<td colspan="3">Challenge by Choice Assessment Options</td>
<td colspan="2">

Base Assessment (ACA-only): Skeletal System Assessment
ACC Assessment Add-on:
Skeletal System Case Study
Answer Key and Digital Case Study

</td>
</tr>
</table>

UNIT 6: Muscular System

Unit Narrative: The muscular system unit builds on students learning of cells, tissue structure and skeletal organization. Students will understand the structure of skeletal muscles and the physiology of how muscles move the human body and the role in homeostasis.

Unit Essential Questions:
- How does the nervous system control muscle contraction?
- What are the components of muscles that allow it to shorten?
- How is energy involved in muscle contraction?
- What happens to a muscle that is fatigued or cramped?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Skeletal Muscle	• I can model and describe the major parts and functions of a skeletal muscle fiber. • I can explain the major events of skeletal muscle contraction. • I can explain how energy and oxygen are used in muscle contraction. • I can distinguish between a twitch and a sustained contraction. **Academic Vocabulary:** Fascia, aponeuroses, myofibrils, myosis, actin, sarcomere, sarcoplasmic reticulum, transverse tubules, motor neuron, neuromuscular junction, motor end plate, neurotransmitters motor unit, troponin, tropomyosin, sliding filament model, acetylcholine, muscle impulse, acetylcholinesterase, creatine phosphate, hemoglobin, myoglobin, oxygen debt, peristalsis	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**SEP** / **DCI** / **CCC** • 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. • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. • Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.	• Muscle structure diagramming • Muscle structure function modeling • Muscle contraction sequencing
(2) Smooth Muscle	• I can differentiate between skeletal and smooth muscle contraction. **Academic Vocabulary:** Peristalsis, Smooth muscle, striated muscle,	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr></table>	**SEP** / **DCI** / **CCC** • Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is	• Muscle Type Graphic Organizer

	cardiac muscle, origin, insertion	<table><tr><td></td><td>Observation</td></tr></table>	itself a component of the next level. • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.	
(3) Cardiac Muscle	• I can compare the contrast mechanisms of cardiac, and skeletal muscle fibers. **Academic Vocabulary:** Peristalsis, Smooth muscle, striated muscle, cardiac muscle, origin, insertion,	<table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	**SEP** / **DCI** / **CCC** • 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. • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.	
			Challenge by Choice Assessment Options	• Base Assessment (ACA-only): The Muscular System Assessment Academic • ACC Assessment Add-on: Muscular System Case Study • Answer key and digital file

UNIT 7: Integumentary System

Unit Narrative: The integumentary unit builds on students learning of cells and tissue structure. The unit begins with identifying the structures associated with the skin and their role in maintaining homeostasis.

Unit Essential Questions:
- How do the membranes of the human body compare?
- Why do we need skin?

<table>
<tr><th>Learning Sequence</th><th>Student Learning Target(s): I can...</th><th>Summative Assessment Strategy</th><th>Connection to the NGSS Dimensions</th><th>Common Learning Experiences</th></tr>
<tr><td>(1)
Membranes</td><td>• I can describe the four major types of membranes.

Academic Vocabulary:
Epidermis, dermis, subcutaneous layer, melanin, hair follicle, sebaceous glands, sweat glands</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>SEP | DCI | CCC
• 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 (including orally, graphically, textually, and mathematically).</td><td>• Model of Similarities and Differences of 4 Major Membranes</td></tr>
<tr><td>(2)
Skin</td><td>• I can name and describe the structures and functions of the skin.
• I can summarize the factors that determine skin color.
• I can describe the role of accessory organisms in maintaining homeostasis.
• I can describe the events that are part of wound healing.

Academic Vocabulary:
Epidermis, dermis, subcutaneous layer, melanin, hair follicle, sebaceous glands, sweat glands</td><td><table><tr><td></td><td>Selected Response</td></tr><tr><td>x</td><td>Constructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table></td><td>SEP | DCI | CCC
• 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 (including orally, graphically, textually, and mathematically).</td><td>• Construct and explanation of wound healing</td></tr>
<tr><td colspan="3">Challenge by Choice Assessment Options</td><td>• Base Assessment (ACA-only): The Integumentary Assessment
• ACC Assessment Add-on: Case Study</td></tr>
</table>

UNIT 8: Cardiovascular System and Blood

Unit Narrative: The cardiovascular unit builds on student learning of cells, tissues and organ structures. The unit begins with organ structure size, location, direction to then build in the physiology of organ and system function. This unit includes the dissection of a mammalian heart and student learning is applied to their final full specimen dissection.

Unit Essential Questions:
- How do various components of the blood work together to maintain homeostasis?
- How can the heart behave as a pump?
- How does blood pressure indicate well being?
- How is organ function related to blood flow?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Blood	• I can describe the major components of blood and their functions. • I can review the steps in blood clotting. • I can explain blood typing and the consequences of mismatching blood types. **Academic Vocabulary:** Plasma, red blood cells, erythrocytes, hemoglobin, erythropoietin, macrophages, white blood cells, leukocytes, platelets, thrombocytes, fibrinogen, blood clot, prothrombin, thrombin, thrombus, embolus, coagulation, antigen, antibodies, blood types	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • 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 (including orally, graphically, textually, and mathematically).	• Blood Clot Formation activity,
(2) The Heart	• I can model and describe the locations and functions of the major parts of the heart. • I can trace the pathway of blood through the heart. • I can relate the cardiac cycle and the ECG pattern. **Academic Vocabulary:** Pulmonary circulation, systemic circulation, pericardium, epicardium, myocardium, endocardium, atria, ventricles, septum, tricuspid valve, bicuspid valve, pulmonary valve, aortic valve, aorta, papillary muscles, coronary arteries, cardiac sinus, cardiac cycle, systole, diastole, cardiac conduction system, sinoatrial node, pacemaker, atrioventricular node, AV bundle, purkinje fibers, Electrocardiogram	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** / **DCI** / **CCC** • Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems. • Use a model to provide mechanistic accounts of phenomena.	• Heart structure labeling • Pathway of blood activity • Heart dissection lab • Cat Dissection
(3) Blood Vessels	• I can compare the structures and functions of the major types of blood vessels.		**SEP** / **DCI** / **CCC**	• ECG Labeling/ modeling • Blood pressure lab

	• I can describe how substances are exchanged between capillaries and tissue fluid. • I can explain how blood pressure is produced and controlled. • I can compare the pulmonary and systemic circuits. **Academic Vocabulary:** Arteries, arterioles, capillaries, venules, veins, vasoconstriction, vasodilation, systolic pressure, diastolic pressure, stroke volume, cardiac output, blood volume, peripheral resistance, blood viscosity,	<table><tr><td></td><td>Selected Response</td></tr><tr><td></td><td>xConstructed Response</td></tr><tr><td>x</td><td>Performance</td></tr><tr><td></td><td>Observation</td></tr></table>	• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/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 (including orally, graphically, textually, and mathematically).	• ECG Lab • Blood Oxygen feedback mechanism
		Challenge by Choice Assessment Options		• Base Assessment (ACA-only):The Cardiovascular System • Blood Academic Assessment • ACC Assessment Add-on: Cardiovascular System Case Study • Blood Case Study

UNIT 9: Digestion and Nutrition

Unit Narrative: The unit builds on student learning cell structure and feedback mechanisms to understand how digestive secretions are regulated. The unit begins with the digestive organ anatomy and builds on that understanding to learn how each organ functions to create a functioning digestive system. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:
- How does each organ of the digestive system contribute to the digestion and/or absorption of food?
- Are you what you eat?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Organs of the Digestive System	• I can name and describe the major organs of the digestive system and their location. • I can explain the actions of the alimentary canal and its accessory organs. • I can describe the actions of enzymes on food. • I can describe the regulation of digestive secretions. • I can model and explain how the products of digestion are absorbed. **Academic Vocabulary:** Digestive, esophagus, abdomen, bile,stomach, appendix cecum chyme, alimentary canal, descending colon, ascending colon, duodenum,ileum, epiglottis, Gallbladder, jejunum ,intestines, gastrointestinal tract, mouth, liver, pancreas, sigmoid colon , peristalsis, salivary glands, transverse colon, rectum, metabolism, enzyme		SEP / DCI / CCC • As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.	• Digestion organs diagram and labeling • Digestive Enzyme model • Digestive secretions modeling • Cat Dissection
(2) Nutrition	• I can model and describe how the body uses carbohydrates, lipids, proteins, vitamins, and minerals in an adequate diet. **Academic Vocabulary:** Digestive, esophagus, abdomen, bile,stomach, appendix cecum chyme, alimentary canal, descending colon, ascending colon, duodenum,ileum, epiglottis, Gallbladder, jejunum ,intestines,		SEP / DCI / CCC • Use a model based on evidence to illustrate the relationships between systems or between components of a system.	• Nutrient absorption model

	Summative Assessment Strategy
	Selected Response
x	Constructed Response
x	Performance
	Observation

	gastrointestinal tract, mouth, liver, pancreas, sigmoid colon , peristalsis, salivary glands, transverse colon, rectum, metabolism, enzyme			
			Challenge by Choice Assessment Options	• Base Assessment (ACA-only): The Digestive System Academic Assessment • ACC Assessment Add-on: The Digestive System Case Study

UNIT 10: Lymphatic System

Unit Narrative: The Lymphatic unit builds on students' understanding of cells and cell differentiation. The unit begins with the anatomy of the lymphatic organs and moves into the overall function of the major lymphatic glands and white blood cells in immunity.

Unit Essential Questions:
- How is the lymphatic system related to the circulatory system?
- Why do we need lymph?
- How are specific and nonspecific defenses related?
- How does a person develop active and passive immunity?

<table>
<tr><th>Learning Sequence</th><th>Student Learning Target(s): I can...</th><th>Summative Assessment Strategy</th><th>Connection to the NGSS Dimensions</th><th>Common Learning Experiences</th></tr>
<tr>
<td>(1)
Lymphatic System</td>
<td>

I can compare and contrast the circulatory and lymphatic systems.
I can describe how tissue fluid and lymph form.
I can describe a lymph node and its major function.
I can distinguish between specific and nonspecific immunity.
I can model and explain how two major lymphocytes are formed, activated and function.
I can distinguish between active and passive immunity.

Academic Vocabulary:
Lymph, Lymphatic System ,Lymph Nodes, Axillary Nodes, Tonsils,Spleen, Thymus Gland, Immunity, Artificial Acquired Immunity, Immunization, Immunoglobulin, Acquired Immunity, Autoimmunity, Natural Immunity
</td>
<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table>
</td>
<td>
<table>
<tr><th>SEP</th><th>DCI</th><th>CCC</th></tr>
</table>

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.
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.
Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.

</td>
<td>

Lymphatic tissues and organs diagram and modeling
Immune System POGIL
Cat Dissection

</td>
</tr>
<tr>
<td colspan="3">Challenge by Choice Assessment Options</td>
<td colspan="2">

Base Assessment (ACA-only): The Lymphatic System Academic Assessment
ACC Assessment Add-on: The Lymphatic System Case Study

</td>
</tr>
</table>

UNIT 11: Respiratory System

Unit Narrative: The respiratory unit builds on students learning of cells and cell transport to understand how gasses are exchanged in the lungs and bloodstream to maintain homeostasis. The unit begins with the structures of the respiratory system and moves into the physiology. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:
- How does the respiratory system contribute to metabolism?
- How does one inhale and exhale?
- How are gases exchanged at the lungs and transported?
- How is breathing controlled?

<table>
<tr><th>Learning Sequence</th><th>Student Learning Target(s): I can...</th><th>Summative Assessment Strategy</th><th>Connection to the NGSS Dimensions</th><th>Common Learning Experiences</th></tr>
<tr>
<td>(1)
Organs of the Respiratory System</td>
<td>● I can name and describe the structure and function of each of the organs of the respiratory system.

Academic Vocabulary:
Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</td>
<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
</table>
</td>
<td>
<table>
<tr><th>SEP</th><th>DCI</th><th>CCC</th></tr>
</table>
● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
</td>
<td>● Respiratory Organs Diagram
● Lung Model / Demonstration
● Cat Dissection</td>
</tr>
<tr>
<td>(2)
Breathing Mechanism</td>
<td>● I can model and explain the mechanism of inhalation and exhalation.
● I can investigate and explore lung volumes and respiratory capacities.

Academic Vocabulary:
Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</td>
<td>
<table>
<tr><td></td><td>Selected Response</td></tr>
<tr><td>x</td><td>Constructed Response</td></tr>
<tr><td>x</td><td>Performance</td></tr>
<tr><td></td><td>Observation</td></tr>
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<td>
<table>
<tr><th>SEP</th><th>DCI</th><th>CCC</th></tr>
</table>
● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
● Use a model to provide mechanistic accounts of phenomena.
</td>
<td>● How we breath lab/ activity</td>
</tr>
<tr>
<td>(3)
Control of Breathing</td>
<td>● I can describe various factors that influence breathing.</td>
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<table>
<tr><th>SEP</th><th>DCI</th><th>CCC</th></tr>
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<td>● How we breath lab/ activity</td>
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Academic Vocabulary:
Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</td>
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As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

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<td>(4)
Gas Exchange</td>
<td>

I can model and explain how air and blood exchange gases.

Academic Vocabulary:
Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen, diffusion
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</table>
</td>
<td>
SEP | DCI | CCC

As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
Use a model to provide mechanistic accounts of phenomena.

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Gas exchange model

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<tr>
<td colspan="3">Challenge by Choice Assessment Options</td>
<td>

Base Assessment (ACA-only): The Respiratory System Assessment
ACC Assessment Add-on: The Respiratory System Case Study

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UNIT 12: Urinary System

Unit Narrative: The Urinary system builds on student learning of cells and tissues. The unit begins with the structure of the organs of the urinary system and moves into physiology of filtering the blood to remove wastes and expel from the human body to maintain homeostasis. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:
- How are the kidneys involved in maintaining blood and body fluid homeostasis?
- How is urine formed?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions	Common Learning Experiences
(1) Kidneys	• I can identify the location, structure, and functions of the kidneys. • I can model and describe the structure and function of a nephron. **Academic Vocabulary:** Kidney, retroperitoneally, renal pelvis, nephrons, renal blood vessels, glomerulus, glomerular capsule, glomerular filtration, glomerular filtrate, urine, tubular secretions, tubular reabsorption, urea, uric acid, ureter, urinary bladder, urethra	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** | **DCI** | **CCC** • Use a model to provide mechanistic accounts of phenomena.	• Urinary organs diagram • Kidney diagram • Cat Dissection
(2) Urine Formation	• I can explain the factors that affect the rate of glomerular filtration. • I can discuss the role of tubular reabsorption and secretion in urine formation. • I can describe the process of micturition and the structures that are involved. **Academic Vocabulary:** Kidney, retroperitoneally, renal pelvis, nephrons, renal blood vessels, glomerulus, glomerular capsule, glomerular filtration, glomerular filtrate, urine, tubular secretions, tubular reabsorption, urea, uric acid, ureter, urinary bladder, urethra	[ ] Selected Response [x] Constructed Response [x] Performance [ ] Observation	**SEP** | **DCI** | **CCC** • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	• Nephron Diagram
		Challenge by Choice Assessment Options		• Base Assessment (ACA-only): The Urinary System Assessment • ACC Assessment Add-on: The Urinary System Case Study

ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT

RESOURCES

Dissection Specimens-Cat, Brain
POGIL Resources