Anatomy Unit 1: Introduction - Organization of Body Systems

Content Area: **Science**
Course(s): **Anatomy and Physiology**
Time Period: **MP1**
Length: **45 days**
Status: **Published**

NJSLS - Science

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.
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Science and Engineering Practices

Developing and Using Models

Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-4)

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. (HS-LS1-3)

Constructing Explanations and Designing Solutions

Construct 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. (HS-LS1-1)

Scientific Investigations Use a Variety of Methods

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. (HS-LS1-3)

Disciplinary Core Ideas

LS1.A: Structure and Function

Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

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. (HS-LS1-1)

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. (HS-LS1-2)

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. (HS-LS1-3)

LS1.B: Growth and Development of Organisms

In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

Crosscutting Concepts

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-LS1-2), (HS-LS1-4)

Structure and Function

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. (HS-LS1-1)

Stability and Change

Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

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Rationale and Transfer Goals

Cells are the structural units of all living things with the human body having 50 to 100 trillion cells. Cells are highly specialized. They each perform specific functions which help maintain homeostasis and benefit the body as whole. They do not operate independently, though. Instead, they form tight communities which live and work together. Cell specialization permits the body to function in sophisticated ways, but division of labor also creates hazards. When a particular group of cells is indispensable, its loss or injury can severely disable or even destroy the body. Groups of cells which have a similar structure and perform common or related functions are called tissues and there are four basic tissues which serve a variety of functions. Students must understand the basic structure and function of cells in order to understand how they function within tissues, organs, organ systems, and as an entire unit within the human body.

The circulatory system is a network of vessels and organs that maintain homeostasis in the body, transport valuable nutrients to cells throughout the system, and remove the wastes produced by cellular function. The pump utilized by this system is a four chambered involuntary muscle that, through rhythmic contractions, pushes blood throughout the body through a network of vessels which includes veins, venules, capillaries, arterioles, and arteries. The connective tissue found in these vessels is blood and it is composed of red cells,

which transports oxygen, white blood cells, which combat intruders, and a liquid matrix, called plasma which contains those extracellular components needed to maintain homeostasis. Transportation of immune components as well as fluid and fat reabsorption is accomplished through the highly complex network of vessels and organs known as the lymphatic system.

Enduring Understandings

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.

The human body is composed of thousands of chemicals which continuously interact with one another at an incredible pace in order to sustain life.

Feedback mechanisms maintain homeostasis by stabilizing or destabilizing a system.

Blood is a connective tissue that transports nutrients and eliminates waste.

Essential Questions

How do the 4 main tissues structure relate to function in the body?

How is the body composed of systems with structures and functions that are related?

How do feedback loops maintain the internal environment of the human body?

What is the relationship between homeostatic imbalance and disease?

How can scientists effectively communicate the location of one body part in relation to others using correct

directional terms?

Content - What will students know?

- How anatomy and physiology are related.
- The different levels of structural organization that make up the human body and their relationships.
- The 11 organ systems of the body, their components, and briefly describing the major function(s) of each.
- The importance of homeostasis to survival.
- The relationship between homeostatic imbalance and disease.
- The terms that describe related positions, body sections and body regions.
- There are 4 tissue types that are organized by structure and function.
- Blood is a connective tissue made of 3 types of cells.
- Blood type is determined by co-dominant alleles and is tested using antigens.
- Blood and lymph are both part of our body's immune response.

Skills - What will students be able to do?

- Define Anatomy and Physiology.
- Students should be able to describe the body systems based on form and function.
- Students should be able to ID the 4 tissue types.
- Students should be able to describe correct anatomical terms in relation to position.
- Students should be able to label and cut along the 3 body planes.
- Students should be able to describe a feedback loop in maintaining homeostasis.
- Students should be able to cross various blood types using Punnett squares.
- Students should be able to ID different blood types using simulated blood samples.
- Represent and explain the relationship between the structure and function of each class of complex

molecules in the human body using a variety of models.

Activities - How will we teach the content and skills?

- Ch.1 notes CH.1 guided notes from book
- Ch.5 notes Chap05studyoutline-tissues
- Ch.12 notes Chap12 notes-blood
- Blood typing lab or blood typing game (https://educationalgames.nobelprize.org/educational/medicine/bloodtypinggame/)
- Histology lab to ID tissue (https://highered.mheducation.com/sites/0070272468/student_view0/martin_lab_manual__webquest.html)
- Tissue flashcards for each of the 4 types
- Literacy (EPO and blood doping)
- Model for directional terms Directional Terms Practice.pdf
- Vocab key terms for each section Vocab template
- Concept map review concept map review template
- Ck12 review concepts (free online text that all teachers can access and use)
- Edpuzzle videos to reinforce concepts (all teachers have access to LHS)
- Lab stations
- Case study appropriate to the body system being covered

Evidence/Assessments - How will we know what students have learned?

- **Assessments can be reviewed for each course in this folder.**
- Quizzes/tests CH 1 test anatomy and physiology
- Copy of Test-CH.5-tissues.docx
- Kahoot scores

- Literacy rubrics
- Benchmark 1

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• Apply anatomical terms in context. • Differentiate between positive and negative feedback loops. • Know and apply various anatomy terms. • List organs in each body cavity. • Name the membranes of body cavities. • Describe body positions, body sections and body regions. • Structure and function of cells. • List the levels of the body from cell to organ system. • Describe homeostatic mechanisms.	• In multicellular organisms, the body is a system of multiple, interacting subsystems. • Organs are groups of tissues that work together to perform a particular body function. • Systems interact with other systems.	• Pre-unit vocabulary • Microscope slides • Lab exercises • Notes and group work • literacy • Labeling and online practice

21st Century Life and Careers

9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.8	Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.

Career Readiness, Life Literacies, & Key Skills

9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
9.4.2.IML.3	Use a variety of sources including multimedia sources to find information about topics such as climate change, with guidance and support from adults (e.g., 6.3.2.GeoGI.2, 6.1.2.HistorySE.3, W.2.6, 1-LSI-2).
9.4.2.IML.4	Compare and contrast the way information is shared in a variety of contexts (e.g., social, academic, athletic) (e.g., 2.2.2.MSC.5, RL.2.9).
9.4.2.TL.1	Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
9.4.2.TL.2	Create a document using a word processing application.
9.4.2.TL.3	Enter information into a spreadsheet and sort the information.
9.4.2.TL.4	Navigate a virtual space to build context and describe the visual content.

Interdisciplinary Connections/Companion Standards

