



## BPS Science Department Anatomy and Physiology

### Anatomy and Physiology – Unit 1 - Introduction to Anatomy and Physiology (Chapter 1)

**Overview:** This unit introduces the study of the structure and function of the human body. This course introduces the student to the concepts of anatomy and physiology and begins with how the body is organized from the chemical level to the organism level. Homeostatic regulation is emphasized along with negative and positive feedback mechanisms. When regulation fails, organ systems malfunction and disease prevails. Anatomical terms are introduced to describe body regions, anatomical positions, and body sections.

#### Essential Questions:

- Why is homeostasis important in the maintenance of the human body systems?
- How does the human body respond to internal and external changes in its environment?
- How does a diseased state compromise the physiology of the human body?
- Why do scientists use anatomical terms in the description of the human body?
- How do the 11 human body systems work together to maintain homeostatic regulation?
- How is the human body organized from the cellular level to the organism level?
- What is the relationship between anatomy and physiology of the human body?

#### NYSSLS Standards:

- **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.**
  - (DCI) **LS1.A: Structure and Function:** Systems of specialized cells within organisms help them perform the essential functions of life
  - (CCC) **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.
  - (SEP) **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-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.**
  - (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 informational flows -- within and between systems at different scales.
  - (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. Use a model based on evidence to illustrate the relationships between systems or between components of a system.
- **HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis**
  - (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.
  - (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



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3D Learning Overview:		Crosscutting Concepts (CCC):		Science and Engineering Practices (SEP):	
<p><b>KNOW</b> → <u>Disciplinary Core Ideas (DCI)</u>: what students need to know</p> <p><b>UNDERSTAND</b> → <u>Crosscutting Concepts (CCC)</u>: what students look for/ applies across all science domains and <u>Science &amp; Engineering Practices (SEP)</u>: how students explore and apply</p>		<ul style="list-style-type: none"> <li>• Patterns</li> <li>• Cause and Effect</li> <li>• Scale, Proportion, and Quantity</li> <li>• Systems and System Models</li> <li>• Energy and Matter</li> <li>• Structure and Function</li> <li>• Stability and Change</li> </ul>		<ul style="list-style-type: none"> <li>• Asking questions (for science) and defining problems (for engineering)</li> <li>• Developing and using models</li> <li>• Planning and carrying out investigations</li> <li>• Analyzing and interpreting data</li> <li>• Using mathematics and computational thinking</li> <li>• Constructing explanations (for science) and designing solutions (for engineering)</li> <li>• Engaging in argument from evidence</li> <li>• Obtaining, evaluating, and communicating information</li> </ul>	
Time Frame	Skills, Practices or Expectations	Textbook Resources	Online Resources	Vocabulary	Higher Order Questions
<p>9.12.22 - 9.23.22</p> <p><b>NOTE:</b> 9.5.22 - Labor Day</p>	<p><b>Human Body Organization:</b> The students will be able to:</p> <ul style="list-style-type: none"> <li>• Describe the levels of organization in the human body from the chemical to organism level.</li> <li>• Describe the 11 human body systems including anatomy and physiology.</li> <li>• Explain the relationship between the anatomy and physiology of the human body.</li> <li>• Explain why scientists use anatomical terms for body planes, positions and cavities.</li> <li>• identify the human body's planes, regions, positions, and cavities.</li> </ul> <p><b>Homeostasis:</b> The students will be able to:</p> <ul style="list-style-type: none"> <li>• Explain homeostasis in the human body through negative and positive feedback.</li> <li>• Analyze a disease given a data set of symptoms.</li> </ul>	<p><b>Chapter 1</b> 1-2 Anatomy &amp; Physiology (p.3-4)</p> <p>1-3 Levels of Organization (p.4-5)</p> <p>1-4 Body Systems (p.6)</p> <ul style="list-style-type: none"> <li>• Figure 1-2 Organs and Functions of 11 Body Systems (p.7-12)</li> </ul> <p>1-5 Homeostasis (p.6,13)</p> <p>1-6 Types of Feedback (p.13-15)</p> <ul style="list-style-type: none"> <li>• Figure 1-4 Negative (p.14)</li> <li>• Figure 1-5 Positive (p.15)</li> </ul> <p>1-7 Anatomical Language (p.15-19)</p> <ul style="list-style-type: none"> <li>• Figure 1-6 Landmarks (p.16)</li> <li>• Figure 1-7 Abdominopelvic Quadrants &amp; Regions (p.17)</li> <li>• Figure 1-8 Directions (p.18)</li> <li>• Table 1-2 Directions (p.19)</li> <li>• Figure 1-9 Planes (p.20)</li> </ul> <p>1-8 Body Cavities (p.20-24)</p> <ul style="list-style-type: none"> <li>• Figure 1-10 Ventral Cavity (p.21)</li> </ul> <p>Chapter 1 Review Questions p.27-28</p>	<p><b>HASPI:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Anatomical Language</a> use <a href="#">sticker labels</a> to identify body parts on a classmate or model; revisit incorrect labels</li> <li>• <a href="#">Body System Poster</a> (group project to create a poster with functions, parts and disorders of one system)</li> <li>• <a href="#">Homeostasis: Cell Tonicity</a> - design an experiment with potatoes to test effects of giving pure water in IV</li> <li>• <a href="#">Homeostasis: Blood pH</a> - use pH strips to test pH of saliva to create a class histogram</li> </ul> <p><a href="#">Banana Activity</a> (body planes notes plus activity directions)</p> <p><b>Z Space Activity: (code)</b> Exploring Human Response to the Flu (E444) Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis</p>	<p>anatomy physiology cell tissue organ organ system organism anatomical position supine/ prone superior/ inferior anterior/ posterior proximal/ distal lateral/ medial superficial/ deep <b>Body Planes:</b> transverse/ horizontal, sagittal (midsagittal/ parasagittal), coronal/ frontal <b>Body Cavities:</b> dorsal (cranial, vertebral), ventral (abdominopelvic, thoracic) homeostasis/ homeostatic regulation disease/ disorder symptoms negative feedback loop positive feedback loop</p>	<ul style="list-style-type: none"> <li>• How do two or more systems work together to maintain homeostasis in a diabetic?</li> <li>• Explain thermoregulation as an example of negative feedback in the human body.</li> <li>• Explain childbirth as an example of positive feedback</li> <li>• When we become dehydrated, we usually become thirsty, which causes us to drink fluids. On the basis of what you now know about control systems, decide whether the thirst sensation is part of a negative or positive feedback control system and defend your choice.</li> <li>• How is the body organized?</li> <li>• Why does the body need to maintain homeostasis?</li> <li>• Jennie fell off her motorcycle and tore a nerve in her axillary region. She also tore ligaments in her cervical and scapular regions and broke the only bone of her right brachial region. Explain where each of her injuries is located.</li> </ul>



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			<a href="#">Teacher Resource pdf</a> <a href="#">Student Resource pdf: homeostasis</a> <a href="#">Student Resource pdf: Staying healthy</a>		
<b>Resources</b>	<p><a href="http://ngss.nsta.org/Classroom-Resources.aspx">http://ngss.nsta.org/Classroom-Resources.aspx</a> - Searchable NYSSLS/NGSS aligned resources curated by NSTA</p> <p><b>Dissection Videos</b> (these videos -- dissection of heart, liver, uterus and eye -- were created in collaboration with the Jacobs School of Medicine and Biomedical Sciences. All dissection videos have two separate segments - an introduction segment and a dissection segment. All segments have an accompanied student activity resource)</p> <p>Access via Schoology BPS Science K-12 Group Resources 9-12 Resources Anatomy &amp; Physiology Dissection Videos</p> <p><a href="#">Virtual Frog Dissection</a> (step by step virtual dissection)</p> <p>PBS Learning Media Dissection Videos and Resources (<a href="#">Sheep Heart</a>, <a href="#">Cow Eye</a>, <a href="#">Frog</a>)</p> <p><a href="#">Virtual Fetal Pig Dissection</a> (from Whitman College)</p> <p><a href="#">Cow Eye Dissection</a> (video, step-by-step virtual dissection, PDF of student lab guide )</p> <p><a href="#">NYSED Bilingual Glossaries</a> – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.</p>				
<b>English Language Learners (ELL) Enhancements</b>  To access <a href="#">hyperlinked</a> material, you must be logged into your BPS Google Drive	<b>Listening</b> <ul style="list-style-type: none"> <li>● <b>Cross- Linguistic Practices:</b> Gives students opportunities to make connections between what they hear and their home language (ex: allow students to listen to a passage and identify cognates.)</li> <li>● <b>Build background knowledge</b></li> <li>● <b>Activating Prior Knowledge</b> means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content</li> <li>● <b>Visuals</b> - GIFs, pictures- assist students in understanding. Use <a href="#">visual thinking strategies</a> to set learning lens</li> <li>● Video to review/ introduce topics– use <a href="#">closed captioning</a> to help students see the words and pronunciations while they listen</li> </ul>	<b>Speaking</b> <ul style="list-style-type: none"> <li>● <b>Sentence Frames</b> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i></li> <li>● <b>Academic Conversation Starters:</b> Have a visual of a list of academic sentence starters that students can refer to in a discussion (helps students have a more science focused dialogue). Examples include- I expect ___ to happen. My data shows that...</li> <li>● <b>Choral Reading</b> - To build fluency, self-confidence and motivation with <a href="#">reading/speaking</a></li> <li>● Create <b>movement</b> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while</li> </ul>	<b>Reading</b> <ul style="list-style-type: none"> <li>● <b>Supplementary Text</b> to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension.</li> <li>● <b>Visual Aids</b> - Pictures or models to support vocabulary words and concepts</li> <li>● Video to review or introduce a topic - use <a href="#">closed captioning</a> to help students read along while they listen to the content</li> <li>● <b>4 Square / Frayer models</b> to help students gain a deeper understanding of vocabulary.</li> <li>● <b>Highlighting</b> important text to assist students in answering questions after the reading.</li> <li>● <b>Chunking</b>-Break reading of text into chunks or paragraphs</li> <li>● <b>Performance Level Descriptors</b> - description of expected output from students based on earned NYSESLAT levels in the modality of reading(Scroll for grades 9-12)</li> </ul>	<b>Writing</b> <ul style="list-style-type: none"> <li>● <b>Sentence Frames</b> - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i></li> <li>● <b>Cloze passages</b> with word banks</li> <li>● <b>Word banks</b></li> <li>● <b>Graphic Organizers</b> to help break down the writing process and organize thoughts</li> <li>● <b>Standards-based sentence stems</b></li> <li>● <b>Performance Level Descriptors</b> - description of expected output from students based on earned NYSESLAT levels</li> </ul>	<b>Instructional Accommodations (depending on the student's needs)</b> <ul style="list-style-type: none"> <li>● <b>Extended time</b> for tests in class, projects and assignments</li> <li>● <b>Directions read.</b> Broken down as necessary</li> <li>● <b>Model</b> how to complete the activity in the lesson</li> <li>● <b>Oral simplification</b> of directions or questions</li> <li>● <b>Translated version</b> of test when available. Student may have both version English and native language version</li> <li>● Use of <a href="#">approved bilingual glossaries</a> from NYS in each subject</li> </ul>



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	<ul style="list-style-type: none"> <li>● <b>Word stretching / Vowel stretching</b> when instructing allows student to listen closely to the pronunciation of the word</li> <li>● <b>Performance Level Descriptors</b> - description of expected output from students based on earned NYSESLAT levels in the modality of listening (Scroll for grades 9-12)</li> </ul>	<p>triggering brain function for optimal learning</p> <ul style="list-style-type: none"> <li>● <b>Performance Level Descriptors</b> - description of expected output from students based on earned NYSESLAT levels in the modality of speaking(Scroll for grades 9-12)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Vocabulary Morphology</b>- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary.</li> </ul>	<p>in the modality of writing(Scroll for grades 9-12)</p>	
<p><b>Special Education Modifications</b></p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><b>Instructional</b></p> <ul style="list-style-type: none"> <li>● <b>Pre-teach</b> vocabulary</li> <li>● Use <b>picture vocabulary</b></li> <li>● Scaffold <b>Depth of Knowledge</b> questions</li> <li>● Provide copy of notes/<b>notes in “cloze”</b> form</li> <li>● Use of <b>Think, Pair, and Share</b> strategy to help process information</li> <li>● <b>Scaffold</b> written assignments with the use of <b>graphic organizers</b></li> <li>● Allow for <b>multiple ways to respond</b> (verbal, written, response board)</li> <li>● Provide <b>model of performance task</b></li> <li>● <b>Modify informational text</b> to fit the needs of the students</li> <li>● Provide a digital or paper <b>interactive notebook</b></li> <li>● Present complex <b>tasks in multiple ways</b></li> <li>● Provide <b>mnemonic strategies</b> for Chemistry concepts</li> </ul>		<p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>● <b>Audio</b> reading of text</li> <li>● <b>Text to type</b> functions</li> <li>● <b>Videos</b> to clarify/visualize Chemistry concepts</li> <li>● <b>Record class lecture/discussions</b> and make accessible to student</li> <li>● <b>Nearpod</b>- interactive presentations of notes</li> <li>● <b>Playposit</b> - show a video clip about the topic and add your own questions for them to answer as they watch</li> <li>● Allow students to type answers in chat on <b>Teams</b></li> </ul> <p><b>Other:</b></p> <ul style="list-style-type: none"> <li>● Arrange seating for maximum engagement and minimum distraction</li> <li>● Accessible lab space (counter level)</li> </ul>		<p><b>In Class Assessments</b></p> <ul style="list-style-type: none"> <li>● Provide <b>review packet or review sheet</b> of concepts covered on the test</li> <li>● Practice similar questions prior to the test</li> <li>● Provide <b>multiple options</b> for projects</li> <li>● Give a <b>timeline</b> of when things are due and remind them of the process often.</li> <li>● <b>Use of timer</b> in class</li> <li>● Break all complex tasks into chunks</li> </ul>
<p><b>Step Up to Writing</b></p> <p>Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources Curriculum Materials</p>	<p><b>SUTW Strategy</b></p> <ul style="list-style-type: none"> <li>● Informal Outline</li> <li>● Color-Coding – Informative/Explanatory Text</li> <li>● Two-column notes</li> <li>● I-V-F Topic Sentence progressing to Four Step Summary Paragraph</li> <li>● CUPS – Capitalization, Usage, Punctuation, Spelling</li> <li>● Transitions</li> </ul>				



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### **Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom**

- Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications
- Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population
  - All students are given an opportunity to engage in science discourse
  - Teacher demonstrates high expectations for all students

CLRT resources which align to Science content are denoted with a \*

