Anatomy and Physiology – Unit 7 - The Endocrine System (Chapter 10)

Overview: The endocrine system, along with the nervous system, functions in the regulation of our body activities. It acts through chemical messengers called hormones that influence growth, development, and metabolic activities. The action of the endocrine system is measured in minutes, hours, or weeks and is more generalized than the action of the nervous system. Endocrine glands do not have ducts to carry their products to a surface. They are called ductless glands. The word endocrine is derived from the Greek terms "endo", meaning within and "krine "meaning to secrete or separate. Hormones are secreted directly into the bloodstream and then carried throughout the body where they influence cells that have receptor sites for that hormone. Both the nervous and endocrine systems must function together to regulate homeostasis in the human body. A disruption in either system may cause diseased state.

Essential Questions:

- How are the anatomy and physiology of the human endocrine system related?
- How does the human endocrine system regulate human body activities using hormones?
- How do the parts of the human endocrine system work together to protect and benefit the human body?
- Why is communication between the endocrine and nervous systems of humans crucial to homeostatic regulation?
- How does the endocrine system work together with the nervous system to maintain homeostatic regulation in the human body?
- What are the functional relationships between the human endocrine system and other human systems?

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 Functio**n: 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 Solution**s: 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

BPS Science Department Anatomy and Physiology

3D Learning Overview:	**Crosscutting Concepts (CCC):**	**Science and Engineering Practices (SEP):**
KNOW → Disciplinary Core Ideas (DCI): what students need to know **UNDERSTAND** → Crosscutting Concepts (CCC): what students look for/ applies across all science domains and Science & Engineering Practices (SEP): how students explore and apply	• Patterns • Cause and Effect • Scale, Proportion, and Quantity • Systems and System Models • Energy and Matter • Structure and Function • Stability and Change	• Asking questions (for science) and defining problems (for engineering) • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations (for science) and designing solutions (for engineering) • Engaging in argument from evidence • Obtaining, evaluating, and communicating information

Time Frame	Skills, Practices or Expectations	Textbook Resources	Online Resources	Vocabulary	Higher Order Questions
1.10.22 - 1.28.22 **NOTE:** **1.17.22 – MLK Jr. Day** **1.24.22 - 1.28.22 - Regents Week**	**Anatomy and Physiology:** The students will be able to: • describe the anatomy and physiology of the human endocrine system. • Describe the chemical structure of a hormone. • Diagram target cell receptors during hormonal action. • Explain the mechanism of hormonal action including target cells and receptors. • Compare and contrast the physiology of the nervous and endocrine systems in humans. • Describe the anatomy and physiology of the major endocrine glands and their hormones. • Describe the functional relationships between the human endocrine system and other human body systems. **Diseases/Disorders:** The students will be able to: • describe a disease or disorder of the human endocrine system including symptoms, diagnosis, medications, prevention, and treatment.	**Chapter 10** 10-1 Homeostasis and Cell Communication (p.346) 10-2 Hormones and Receptors (p.347-351) • Figure 10-1 Glands and Hormones (p.348) • Figure 10-2 Target Cells (p.349) • Figure 10-4 Hypothalamus (p.351) 10-3 Pituitary Gland (p.352-356) • Figure 10-8 Pituitary Hormones and Targets (p.356) 10-4 Thyroid Gland (p.357-359) • Figure 10-10 Homeostasis and Calcium (p.359) 10-5 Parathyroid Glands (p.360) 10-6 Suprarenal Glands (p.361-363) • Figure 10-12 Suprarenal Gland (p.362) 10-7 Pineal Gland (p.363-363)	Michigan State Histology Slides: Endocrine System UB Case Studies: • Chemical Eric - symptoms and treatment for pituitary tumor as well as hormone replacement therapy • Andrea: The Death of a Diabetic - learn about signs, symptoms and treatment of diabetes and the role of insulin • It's Just Stress, Right? - look at the role and function of the thyroid and symptoms of dysfunction including Grave's disease • Morgan: A Case of Diabetes - look at treatments for diabetes from three different perspectives • A Grumpy Old Man - role of calcium in bone density, pituitary gland and body system function	hormone receptor target cells Endocrine Glands: thyroid, parathyroid, pancreatic islets, pituitary, hypothalamus, suprarenal (adrenal), pineal, thymus homeostasis/ homeostatic regulation disease/ disorder symptoms negative feedback loop positive feedback loop	• How do two or more systems work together to maintain homeostasis in Diabetes Mellitus? • How does the aging process change the human endocrine system? • How does hyperthyroidism affect homeostatic regulation of the human endocrine system? • Explain the physiological effects of stress on the interactions between the human endocrine system and other body systems. • Explain how the illegal use of hormones may lead to a diseased state or death in athletes.

	• Diagnose a human endocrine system disease/disorder given a data set of symptoms. • Explain homeostasis in the human endocrine system through negative and positive feedback mechanisms. • Predict prevention and treatment of a human endocrine system disorder based on a given data set.	10-8 Pancreas (p.364-365) • Figure 10-13 Pancreas 10-10 Hormones Coordinate Responses (p.368-372) • Figure 10-15 General Adaptation Syndrome (p.370)	Explore Diabetes (interactive with various videos explaining diabetes and treatment options)		
	http://ngss.nsta.org/Classroom-Resources.aspx - Searchable NYSSLS/NGSS aligned resources curated by NSTA Dissection Videos (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) Access via Schoology→BPS Science K-12 Group→Resources→9-12 Resources→Anatomy & Physiology→Dissection Videos Virtual Frog Dissection (step by step virtual dissection) PBS Learning Media Dissection Videos and Resources (Sheep Heart, Cow Eye, Frog) Virtual Fetal Pig Dissection (from Whitman College) Cow Eye Dissection (video, step-by-step virtual dissection, PDF of student lab guide) NYSED Bilingual Glossaries – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.				

English Language Learners (ELL) Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive	**Listening** • **Cross- Linguistic Practices:** 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.) • **Build background knowledge** • **Activating Prior Knowledge** **Activating Prior Knowledge** means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content • **Visuals** - GIFs, pictures- assist students in understanding. Use **visual thinking strategies** to set learning lens • Video to review/ introduce topics– use **closed captioning** to help students see the words and pronunciations while they listen	**Speaking** • **Sentence Frames** - to begin a sentence - such as *Evolution is…* or *I think that evolution is…* • **Academic Conversation Starters:** 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… • **Choral Reading** - To build fluency, self-confidence and motivation with reading/speaking • Create **movement** to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of	**Reading** • **Supplementary Text** to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. • **Visual Aids** - Pictures or models to support vocabulary words and concepts • Video to review or introduce a topic - use **closed captioning** to help students read along while they listen to the content • **4 Square / Frayer models** to help students gain a deeper understanding of vocabulary. • **Highlighting** important text to assist students in answering questions after the reading. • **Chunking**-Break reading of text into chunks or paragraphs • **Performance Level Descriptors** - description of expected output from students based on earned NYSESLAT levels in the modality of reading(Scroll for grades 9-12)	**Writing** • **Sentence Frames** - to begin a sentence- such as *Biodiversity is…* or *An example of competition is….* • **Cloze passages** with word banks • **Word banks** • **Graphic Organizers** to help break down the writing process and organize thoughts • **Standards-based sentence stems** • **Performance Level Descriptors** - description of expected output from students based on earned NYSESLAT levels in the

	• **Word stretching / Vowel stretching** when instructing allows student to listen closely to the pronunciation of the word • **Performance Level Descriptors** - description of expected output from students based on earned NYSESLAT levels in the modality of listening (Scroll for grades 9-12)	fluent reading while triggering brain function for optimal learning • **Performance Level Descriptors** - description of expected output from students based on earned NYSESLAT levels in the modality of speaking(Scroll for grades 9-12)	• **Vocabulary Morphology**- 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.	modality of writing(Scroll for grades 9-12)
Special Education Modifications **Special Education students must have accommodations as per Individual Educational Plan (IEP) or 504 Plan**	**Instructional** • **Pre-teach** vocabulary • Use **picture vocabulary** • Scaffold **Depth of Knowledge** questions • Provide copy of notes/**notes in "cloze"** form • Use of **Think, Pair, and Share** strategy to help process information • **Scaffold** written assignments with the use of **graphic organizers** • Allow for **multiple ways to respond** (verbal, written, response board) • Provide **model of performance task** • **Modify informational text** to fit the needs of the students • Provide a digital or paper i**nteractive notebook** • Present complex **tasks in multiple ways** • Provide **mnemonic strategies** for Anatomy concepts	**Technology:** • **Audio** reading of text • **Text to type** functions • **Videos** to clarify/visualize Anatomy concepts • **Record class lecture/discussions** and make accessible to student • **Nearpod**- interactive presentations of notes • **Playposit** - show a video clip about the topic and add your own questions for them to answer as they watch • Allow students to type answers in discussions in Schoology or in chat on **Teams** **Other:** • Arrange seating for maximum engagement and minimum distraction • Accessible lab space (counter level)	**In Class Assessments** • Provide **review packet or review sheet** of concepts covered on the test • Practice similar questions prior to the test • Provide **multiple options** for projects • Give a **timeline** of when things are due and remind them of the process often. • **Use of timer** in class • Break all complex tasks into chunks	
Step Up to Writing Schoology→ BPS Science K-12 Group→Resources →9-12 Resources →Anatomy & Physiology→ Curriculum Materials	**SUTW Strategies** • Informal Outline • Color-Coding – Informative/Explanatory Text • Two-column notes • I-V-F Topic Sentence progressing to Four Step Summary Paragraph • CUPS – Capitalization, Usage, Punctuation, Spelling • Transitions			