

Keansburg High School Science Department

Pacing Chart

Course: Anatomy & Physiology

Text: Hole's Essentials of Human Anatomy & Physiology 10th ed. McGraw-Hill; 2010

Ice Breaker	1 Block
Unit 1: Levels of Organization	15 Blocks
Unit 2: Support and Movement	14 Blocks
Unit 3: Integration and Coordination	14 Blocks
Midterm Review and Examination	2 Blocks
Unit 4: Transport	14 Blocks
Unit 5: Absorption and Excretion	14 Blocks
Unit 6: The Human Life Cycle	14 Blocks
Final Review and Examination	2 Blocks
	90 Blocks

Unit 1: Levels of Organization

Length of time: 14 Blocks

Essential or Driving Question(s):

- What factors probably stimulated an early interest in the human body?
- What kinds of activities helped promote the development of modern medical science?
- Why is it difficult to separate the topics of anatomy and physiology?
- List several examples that illustrate how the structure of a body part makes possible its function?
- How does the human body illustrate levels of organization?

Standards or Established Goals:

NJCCCS

- **5.1 Science Practices:** All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
- **12.A:**
 - 1. Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
 - 2. Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
 - 3. Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.

Understandings: (Performance objectives)

Students will be able to....

- Chapter 1 *Introduction to Human Anatomy and Physiology*
 - Describe the early studies into the workings of the body.
 - Define anatomy and physiology, and explain how they are related.
 - List the biological levels of organization and the characteristics of each.
 - Name the membranes associated with thoracic and abdominopelvic cavities.
- Chapter 2 *Chemical Basis of Life*
 - Give examples of how the study of living material depends on the study of chemistry
 - Describe how atomic structures determine how atoms interact.
 - Explain how molecular and structural formulas symbolize the composition compounds.
 - Define pH.
 - List the major groups of inorganic chemicals common in cells.
- Chapter 3 *Cells*
 - Define what a cell is.
 - Explain how cells differ from one another.
 - Describe each type of organelle, and explain its function.
 - Compare and contrast various ways that substances move through cell membranes.
 - Distinguish between a stem cell and a progenitor cell.
- Chapter 4 *Cellular Metabolism*
 - Briefly explain the role of metabolism.
 - Compare and contrast anabolism and catabolism.
 - Describe how enzymes control metabolic reactions.
 - List the basic steps of an enzyme-catalyzed reaction.
 - Define gene and chromosome.
- Chapter 5 *Tissues*
 - List the four major tissue types, and tell where each is located in the body.
 - Describe the general characteristics and functions of epithelial tissues.
 - Name the types of epithelium, and for each type, identify an organ in which that type is found.
 - Distinguish among the four major types of membranes.

Knowledge/Skills:

- Assume the anatomical position. Ask the students to comment on how that position differs from the “usual” standing position and to explain why knowing this position is important to precisely identify anatomical terms and physiological process.
- Remove all the organs from the ventral and dorsal body cavities of a human torso model. Ask for volunteers or assign students to return them to their proper anatomic location. As each organ is properly repositioned, the rest of the students are to call out its name and organ system relationship.

Suggested Print Materials/Resources/Internet Links

- Chapters
 - o 1 – Introduction to Human Anatomy and Physiology
 - o 2 – Chemical Basis of Life
 - o 3 - Cells
 - o 4 – Cellular Metabolism
 - o 5 - Tissues
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Microsoft PowerPoint Notes: Chapters 1,2,3,4,5

Suggested Learning Activities:

- Check Your Recall on textbook pages 79 and 80.
- Integrative Assessments/Critical Thinking on textbook page 21
- Mix and Match with chapters 2 and 3 vocabulary
- Homework – Chapter 1 Assessment on textbook page 20
- Do Now – How does an enzyme recognize its substrate?

Assessments/Evidence of Learning:

- Writing activity – Picture Prompt: chronic exposure to arsenic in drinking water
- Safety Quiz
- Test – Chapter 1
- Interval Assessment
- PowerPoint Presentation – Human Body Systems

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP
- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction
- Check for student understanding
- Phone calls home to ensure student success

Unit 2: Support and Movement

Length of time: 14 Blocks

Essential or Driving Question(s):

- What are the functions of the subcutaneous layer?
- How do compact and spongy bone differ in structure?
- What is the function of melanin?
- Which bones form the pectoral girdle?
- What factors influence skin color?

Standards or Established Goals:

NJCCCS

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

- 12.B:
 - 1. Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
 - 2. Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
 - 3. Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
 - 4. Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

Understandings: (Performance objectives)

Students will be able to....

- Chapter 6 *Integumentary System*
 - Define organ, and name the large organ of the integumentary system.
 - List the general functions of the skin.
 - Describe the structure of the layers of the skin.
 - Summarize the factors that determine color.
 - Explain how the skin helps regulate body temperature.
- Chapter 7 *Skeletal System*
 - List the active tissues in a bone.
 - Discuss the major functions of bones.
 - Describe the macroscopic and microscopic structure of a long bone, and list the functions of these parts.
 - List six types of synovial joints, and describe the actions of each.
 - Explain how skeletal muscles produce movements at joints, and identify several types of joint movements.
- Chapter 8 *Muscular System*
 - List various outcomes of muscular actions.

- o Describe how connective tissue is part of a skeletal muscle.
- o Name the major parts of a skeletal muscle fiber, and describe the function of each.
- o Discuss nervous stimulation of a skeletal muscle.
- o Identify

Knowledge/Skills:

- Call out an action, and ask students to provide the name of the muscle responsible for that action. Or, provide the name of a muscle and ask students to identify the antagonists and synergists.
- Have students obtain information on the procedures used to build muscle mass and how those procedures accomplish that goal. Also discuss atrophy as a result of wearing a cast on a broken limb, and discuss what can be done about it.

Suggested Print Materials/Resources/Internet Links:

- Chapters
 - o 6 – Integumentary System
 - o 7 – Skeletal System
 - o 8 – Muscular System
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Body Atlas DVD: Muscle and Bone
- Microsoft PowerPoint Notes: Chapters 6,7,8

Suggested Learning Activities:

- Do Now – What is the function of a synergist? An antagonist?
- Check Your Recall on textbook pages 117 and 120.
- Integrative Assessments/Critical Thinking on textbook page 172
- Mix and Match with chapters 7 and 8 vocabulary
- Homework – Chapter 2 Assessment on textbook page 209
- WebQuest – Body Building

Assessments/Evidence of Learning:

- Quiz – Chapter 6
- Writing activities – Report: I am Joe's . . . (i.e. stomach, foot, brain, etc.)
- Test – Chapter 7
- Interval Assessment
- Project –Draw and Label Life Size Diagrams of Major Skeletal Muscles

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP
- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction

- Check for student understanding
- Phone calls home to ensure student success

Unit 3: Integration and Coordination

Length of time: 14 Blocks

Essential or Driving Question(s):

- What are the two major types of cells that form nervous tissue?
- How do sensory receptors collect information?
- What are the two major subdivisions of the nervous system?
- Why types of chemicals function on neurotransmitters?
- What are possible fates of neurotransmitters?

Standards or Established Goals:

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

- 12.C:
 - 1. Reflect on and revise understandings as new evidence emerges.
 - 2. Use data representations and new models to revise predictions and explanations.
 - 3. Consider alternative theories to interpret and evaluate evidence-based arguments.

Understandings: (Performance objectives)

Students will be able to....

- Chapter 9 *Nervous System*
 - Distinguish between the two types of cells that compromise nervous tissue.
 - Name the two major groups of nervous system organs.
 - Explain the general functions of the nervous system.
 - State the functions of neurological cells in the central nervous system.
 - Describe the Schwann cells of the peripheral nervous system.
- Chapter 10 *The Senses*
 - Distinguish between somatic senses and special senses
 - Name five kinds of receptors, and explain their functions
 - Explain how a sensation arises.
 - Describe how the sense of pain is produced.
 - Identify the locations of the receptors associated with the special senses.
- Chapter 11 *Endocrine System*
 - Define hormone.
 - Distinguish between paracrine and autocrine secretions.
 - Explain how the nervous and endocrine systems are alike and how they are different.
 - Name some functions of hormones.

- o Discuss how negative feedback mechanisms regulate hormonal control secretions.

Knowledge/Skills:

- Have the students research the current applications and experimental uses of recombinant human growth hormone, and use their findings to promote a class discussion.
- Perform selected vision tests, including visual acuity using Snellen's chart and color deficiency using Ishihara's color plates.

Suggested Print Materials/Resources/Internet Links:

- Chapters
 - o 9 – Nervous System
 - o 10 – The Senses
 - o 11 – Endocrine System
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Body Atlas DVD: Gland and Hormones, The Brain
- Microsoft PowerPoint Notes: Chapters 9,10,11
- Book - Stiff: The Curious Lives of Human Cadavers; Mary Roach

Suggested Learning Activities:

- Do Now – What are the two major types of cells that form nervous tissue?
- Check Your Recall on textbook pages 261 and 263.
- Integrative Assessments/Critical Thinking on textbook page 288
- Mix and Match with chapters 10 and 11 vocabulary
- Homework – Chapter 11 Assessment on textbook page 315

Assessments/Evidence of Learning:

- Quiz – Chapter 9
- Project – Draw and Label a Diagram of a sense organ (i.e. ear, nose, tongue)
- Test – Chapter 10
- Interval Assessment
- Group Presentation – Research Nervous System Disorders and share findings

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP
- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction
- Check for student understanding

- Phone calls home to ensure student success

Unit 4: Transport

Length of time: 14 Blocks

Essential or Driving Question(s):

- What is the function of hemoglobin?
- How does a red blood cell change as it matures?
- Where is the heart located?
- Which vessels supply blood to the myocardium?
- What is a functional syncytium?

Standards or Established Goals:

5.1 Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

- 12.D:
 - 1. Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
 - 2. Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
 - 3. Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

Understandings: (Performance objectives)

Students will be able to....

- Chapter 12 *Blood*
 - Describe the general characteristics of blood, and discuss its major functions.
 - Distinguish among the formed elements and liquid portion of blood.
 - Explain the significance of red blood cell counts.
 - Summarize the control of red blood cell production.
 - Describe the functions of each of the major components of blood plasma.
- Chapter 13 *Cardiovascular System*
 - Name the structures composing the cardiovascular system.
 - Discuss the cardiac cycle and the cardiac conduction system.
 - Explain how the cardiac cycle is controlled.
 - Explain how blood pressure is produced and controlled.
 - Identify the parts of a normal ECG pattern, and discuss the significance of this pattern.
- Chapter 14 *Lymphatic System and Immunity*
 - Describe the general functions of the lymphatic systems.
 - Identify the locations of the major lymphatic pathways.
 - Explain how lymphatic circulation is maintained.
 - Discuss the locations and functions of the thymus and spleen.
 - Describe a lymph node and its major functions.

Knowledge/Skills:

- Show examples of stained WBCs and explain how Wright's and other stains are used to differentiate between agranulocytes and the cells found in each category
- Have students research different diseases that are transmitted via blood. Discuss why many of these diseases are increasing in incidence and explain why careful handling of blood in the clinical agency is vitally important.

Suggested Print Materials/Resources/Internet Links:

- Chapters
 - o 12 – Blood
 - o 13 – Cardiovascular System
 - o 14 – Lymphatic System and Immunity
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Body Atlas DVD: The Human Pump
- Microsoft PowerPoint Notes: Chapters 12, 13, 14
- Book - Stiff: The Curious Lives of Human Cadavers; Mary Roach

Suggested Learning Activities:

- Foldable – Systems of the Human Body
- Do Now – What are the general functions of the lymphatic system?
- Check Your Recall on textbook pages 342 and 345
- Homework – Chapter 14 Assessment on textbook page 399
- Integrative Assessments/Critical Thinking on textbook page 400

Assessments/Evidence of Learning:

- Midterm Examination
- Quiz – Chapter 12
- Writing Activity: Paper – Pros and Cons of Donating Blood
- Test – Chapter 13
- Interval Assessment

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP
- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction
- Check for student understanding
- Phone calls home to ensure student success

Unit 5: Absorption and Excretion

Length of time: 14 Blocks

Essential or Driving Question(s):

- Which organs constitute the digestive system?
- How does the tongue function as part of the digestive system?
- Where are the tonsils located?
- What is the function of saliva?
- Where are the major salivary glands located?

Standards or Established Goals:

5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.

- 12.A:
 - 1. Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models.
 - 2. Demonstrate the properties and functions of enzymes by designing and carrying out an experiment.
 - 3. Predict a cell's response in a given set of environmental conditions.
 - 4. Distinguish between the processes of cellular growth (cell division) and development (differentiation).
 - 5. Describe modern applications of the regulation of cell differentiation and analyze the benefits and risks (e.g., stem cells, sex determination).
 - 6. Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

Understandings: (Performance objectives)

Students will be able to....

- Chapter 15 *Digestive System and Nutrition*
 - Describe the general functions of the digestive system
 - Name the major organs of the digestive system.
 - Explain how the contents of the alimentary canal are mixed and moved.
 - Identify the function of each enzyme secreted by the digestive organs.
 - List the major sources of carbohydrates, lipids, and proteins.
- Chapter 16 *Respiratory System*
 - Identify the general functions of the respiratory system.
 - Describe the locations of the organs of the respiratory system.
 - Explain the mechanisms of inspiration and expiration.
 - Define each of the respiratory volumes and capacities.
 - Discuss how various factors affect the respiratory areas.
- Chapter 17 *Urinary System*
 - List the general functions of the organs of the urinary system.

- o Describe the locations and structure of the kidneys.
- o Trace the pathway of blood through the major vessels within a kidney.
- o Explain how glomerular filtrate is produced, and describe its composition.
- o Discuss the role tubular reabsorption in urine formation.

Knowledge/Skills:

- Provide diagrams of the urinary system for students to label.
- Have the students practice different types of breathing, such as diaphragmatic, abdominal, and shallow breathing, and note the muscles and organs used in each method.

Suggested Print Materials/Resources/Internet Links:

- Chapters
 - o 15 – Digestive System and Nutrition
 - o 16 – Respiratory System
 - o 17 – Urinary System
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Body Atlas DVD: The Food Machine
- Microsoft PowerPoint Notes: Chapters 15, 16, 17
- Book - Stiff: The Curious Lives of Human Cadavers; Mary Roach

Suggested Learning Activities:

- Worksheet: National Geographic Article – Allergy Misery
- Do Now – Where are the kidneys located?
- Check Your Recall on textbook pages 485 and 486
- Foldable – Water Soluble and Fat Soluble Vitamins
- Homework – Chapter 17 Assessment on textbook page 489
- Integrative Assessments/Critical Thinking on textbook page 490

Assessments/Evidence of Learning:

- Outline Section 15.11 Nutrition and Nutrients
- Writing activity – Digestive System Timeline: Ingestion to Defecation
- Quiz – Chapter 15
- Test – Chapter 16
- Interval Assessment

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP

- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction
- Check for student understanding
- Phone calls home to ensure student success

Unit 6: The Human Life Cycle

Length of time: 14 Blocks

Essential or Driving Question(s):

- Where in the testes are the sperm cells produced?
- Which cells produce male sex hormones?
- What is the function of a seminal vesicle?
- How do an embryo and a fetus differ?
- What other hormonal changes occur during pregnancy?

Standards or Established Goals:

5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.

- 12.D:
 - 1. Explain the value and potential applications of genome projects.
 - 2. Predict the potential impact on an organism (no impact, significant impact) given a change in a specific DNA code, and provide specific real world examples of conditions caused by mutations.
 - 3. Demonstrate through modeling how the sorting and recombination of genes during sexual reproduction has an effect on variation in offspring (meiosis, fertilization).

Understandings: (Performance objectives)

Students will be able to....

- Chapter 19 *Reproductive Systems*
 - State the general functions of the male and female reproductive systems.
 - Describe the general functions of each part of the male reproductive system.
 - Outline the process of spermatogenesis.
 - Describe semen production and exit from the body.
 - Outline the process of oogenesis.
- Chapter 20 *Pregnancy, Growth, Development, and Genetics*
 - Distinguish between growth and development.
 - Describe the process of fertilization resulting in pregnancy.
 - Describe the major events of cleavage.
 - Distinguish between an embryo and a fetus.
 - Describe the components of the multifactorial traits.

Knowledge/Skills:

- Have students find and bring in articles that deal with the effects of maternal drug use or alcoholism on the fetus. Use this information as a starting point for class discussion, including a discussion of fetal alcohol syndrome.
- Ask students to research sexually transmitted diseases and present their findings on the top five STDs in their local area compared to the national figures.

Suggested Print Materials/Resources/Internet Links:

- Chapters
 - o 19 – Reproductive Systems
 - o 20 – Pregnancy, Growth, Development, and Genetics
- <http://www.mhhe.com/biosci2/anatomyrevealed/>
- Body Atlas DVD: Sex, In The Womb
- Microsoft PowerPoint Notes: Chapters 19, 20
- Book - Stiff: The Curious Lives of Human Cadavers; Mary Roach

Suggested Learning Activities:

- Do Now – Which umbilical vessel carries oxygenated blood to the fetus?
- Outline Section 20.2 Pregnancy
- Integrative Assessments/Critical Thinking on textbook page 21
- Mix and Match terms with chapters 19 and 20 vocabulary
- Homework – Chapter 20 Assessment on textbook page 565

Assessments/Evidence of Learning:

- PowerPoint presentation – Sexually Transmitted Diseases
- Writing activity – Picture Prompt: Quintuplets
- Quiz – Chapter 19
- Test – Chapter 20
- Interval Assessment
- Final Examination

Accommodations:

- Use of audio/visual, graphic organizers, scripted notes, modify assessments as dictated by student IEP. Testing modifications as stated in student IEP
- Visual reinforcement
- Repeat, clarify, reword directions
- Preferential seating/ grouping
- Small group/ one-on-one instruction
- Check for student understanding
- Phone calls home to ensure student success