



Scope & Sequence

This high school honors anatomy and physiology course introduces students to the structure and functions of the human body, from cells and tissues to each of the 11 major body systems. With an emphasis on how these systems work together to maintain homeostasis, students will discover how the body responds to challenges and supports everyday life. Through engaging video lessons, diagrams, and hands-on activities, they'll gain a solid foundation in anatomy and physiology that prepares them for future studies in advanced biology, health, or medical-related fields and deepens their awe for God's incredible design.

Lesson 1: Meet the Human Body

- What anatomy and physiology are and how they work together
- Levels of organization in the human body, from cells to systems
- Introduction to anatomical terms, positions, and body planes

Lesson 2: The Cell: Building Blocks of Life

- The structure and function of the cell and its parts
- Roles of key organelles
- How the plasma membrane regulates what enters and exits the cell
- Homeostasis and feedback loops

Lesson 3: The Blueprint of Life: Protein Synthesis & the Cell Cycle

- The structure and function of DNA
- DNA replication
- Stages of the cell cycle
- Protein synthesis: transcription and translation

Lesson 4: The Body's Living Framework

- How cells join together to form tissues
- The four main tissue types in the human body
- Structure and function of epithelial, connective, muscle, and nervous tissues
- The role of membranes in protection and support

Lesson 5: The Integumentary System: The Body's First Defense

- The structure and function of the skin's layers
 - The roles of keratinocytes and melanocytes
 - Accessory structures (hair, nails, and glands) and their unique functions
- How sensory receptors connect the skin to the nervous system

Lesson 6: The Skeletal System: Support From the Inside Out

- The functions of the skeletal system
- Organization of the skeleton: axial vs. appendicular
- Types of bones and their roles in the body
- Gross and microscopic anatomy of a long bone
- The role of bone marrow and bone cells in maintaining bone health

Lesson 7: The Skeletal System: Growth, Repair, & Movement

- How bones develop and grow throughout life
- The role of growth plates and hormones in bone lengthening
- Bone remodeling and repair
- The anatomy and types of joints

Lesson 8: Exam 1

Lesson 9: The Muscular System: Designed for Motion

- The functions of the muscular system
- Three types of muscle tissue and their shared and unique characteristics
- The structure of skeletal muscle fibers and how they contract
- How skeletal muscles are named
- Basic movement vocabulary

Lesson 10: The Muscular System: Power That Lasts

- How nerves signal muscles to contract
- The sliding filament theory: actin, myosin, calcium, and ATP
- Energy systems for muscle contraction and why fatigue happens
- Fast-twitch vs. slow-twitch fibers: built for power or endurance

Lesson 11: The Muscular System: Mechanics in Motion

- How muscles attach to bones: origins, insertions, and tendons
- Why muscles pull (not push) and how opposing pairs create balance
- Lever systems: how bones, joints, and muscles generate movement
- Roles of agonists, antagonists, synergists, and stabilizers

Lesson 12: The Nervous System: Wired for Action

- The central and peripheral nervous systems
- The sensory–integration–motor pathway
- Somatic (voluntary) vs. autonomic (involuntary) control
- The structure and function of neurons and glial cells

Lesson 13: The Central Nervous System: The Control Center

- The brain's regions and their specialized functions
- Structures that support brain complexity: gyri, sulci, fissures, arbor vitae
- The spinal cord: structure, communication, and the reflex arc
- Spinal nerves and dermatomes
- How the brain and spinal cord are protected

Lesson 14: The Peripheral Nervous System: The Nerve Network

- Cranial nerves and their roles
- How spinal nerves form plexuses and connect the body
- The somatic nervous system and proprioception
- The autonomic nervous system: sympathetic vs. parasympathetic control

Lesson 15: The Wonder of the Senses

- How the body gathers and interprets sensory information
- General senses: touch, temperature, pain, and sensory adaptation
- Special senses: sight, hearing, balance, smell, and taste
- How eyes and ears translate stimuli into signals
- What happens when sensory systems fail

Lesson 16: The Endocrine System: Chemical Commands

- How hormones regulate body functions and maintain balance
- The role of the hypothalamus and pituitary gland
- How hormones travel and bind to target cells
- Major endocrine glands and their key hormones

Lesson 17: Exam 2

Lesson 18: The Cardiovascular System: Powered by the Heart

- Functions of the cardiovascular system: transport, regulation, protection
- Heart structure: chambers, valves, layers, and vessels
- The design and function of cardiac muscle
- Blood flow through pulmonary and systemic circuits
- Common structural disorders of the heart

Lesson 19: The Cardiovascular System: Keeping the Beat

- The cardiac cycle: systole and diastole
- The heart's electrical conduction system
- Heart sounds and basics of an EKG
- How heart rate and vessel tone adjust to body demands

Lesson 20: The Cardiovascular System: Blood & Vessels

- What blood is made of and what each part does
- How blood clots to prevent loss
- Blood vessel structure and function
- What blood pressure is and factors that influences it
- Vascular health disorders and lifestyle influences

Lesson 21: The Respiratory System: Breath of Life

- The primary functions of the respiratory system: oxygen in, carbon dioxide out
- The structures of the upper and lower respiratory tracts and the path of a breath
- How the diaphragm and intercostal muscles use pressure changes to move air
- The design of the lungs: bronchial tree, pleura, alveoli, and surfactant
- Introductory respiratory disorders

Lesson 22: The Respiratory System: Fueling Cells With Oxygen

- How gas exchange occurs in the alveoli and capillaries (external respiration)
- Oxygen transport by hemoglobin and delivery to body tissues (internal respiration)
- Aerobic cellular respiration in the mitochondria
- Carbon dioxide as a normal waste product and breathing regulator
- How the respiratory, cardiovascular, and cellular systems work together

Lesson 23: The Lymphatic & Immune System: Transport, Balance, & Preparation

- Structure and functions of the lymphatic system
- Lymph vessels, nodes, and organs
- Why fluid balance matters and how edema affects tissue health
- How lymphatic structures support immune defense

Lesson 24: The Lymphatic & Immune System: Innate Defense

- Characteristics of innate immunity
- Surface barriers: skin, mucous membranes, and chemical defenses
- Inflammatory response: vasodilation, phagocytosis, and complement activation
- Systemic innate responses: interferons, natural killer cells, and fever

Lesson 25: The Lymphatic & Immune System: Adaptive Defense & Immune Response

- Adaptive immunity and immune specificity
- The roles of B cells, T cells, and antibodies
- Active vs. passive immunity and immune memory
- How pathogens disrupt homeostasis and how the immune system responds over time
- Vaccines, antibiotics, and the importance of immune balance and regulation

Lesson 26: Exam 3

Lesson 27: The Digestive System: Anatomy & Mechanics

- The functions of the digestive system
- The organs of the alimentary canal and accessory organs
- Mechanical digestion and movement of food through the digestive tract
- Peristalsis and segmentation and their roles in digestion

Lesson 28: The Digestive System: Chemical Digestion & Absorption

- Chemical digestion and the role of enzyme and pH regulation
- Structure of the small intestine: folds, villi, and microvilli
- Absorption of nutrients into the bloodstream and lymphatic system
- Roles of macronutrients, micronutrients, and the gut microbiome in overall health

Lesson 29: The Urinary System: Filtration, Structure, & Flow

- The functions of the urinary system and its role in homeostasis
- The organs of the urinary system and the pathway of urine
- External and internal kidney anatomy
- The nephron as the microscopic working unit of the kidney
- Blood flow through the kidney

Lesson 30: The Urinary System: Urine Formation, Regulation, & Balance

- Urine formation: filtration, reabsorption, and secretion
- The pathway of urine from the nephron to elimination
- Characteristics of urine and what urine can reveal about the body
- How the kidneys regulate water balance, electrolytes, pH, blood volume, and blood pressure
- Hormonal control of urine production

Lesson 31: The Male Reproductive System

- The primary functions of the male reproductive system
- Male reproductive anatomy and the pathway of sperm
- Sperm cell structure, maturation, transport, and the formation of semen
- Spermatogenesis and hormonal regulation

Lesson 32: The Female Reproductive System

- The primary functions of the female reproductive system
- Female reproductive anatomy and the pathway of the oocyte
- Oogenesis, the ovarian cycle, and the menstrual cycle
- Hormonal regulation

Lesson 33: Human Development: From Fertilization to the First Breath

- Fertilization and formation of a genetically unique zygote
- Embryonic support structures
- Embryonic and fetal development across three trimesters
- Labor, birth, and the transition to life outside the womb

Lesson 34: The Body in Balance: Systems Working Together

- How multiple body systems respond to changing internal and external conditions
- Feedback mechanisms that maintain active stability in the body
- Redundancy, reserve capacity, allostasis, and physiological trade-offs as ways the body adapts under pressure
- Integrated responses to exercise, stress, and illness

Lesson 35: Exam 4