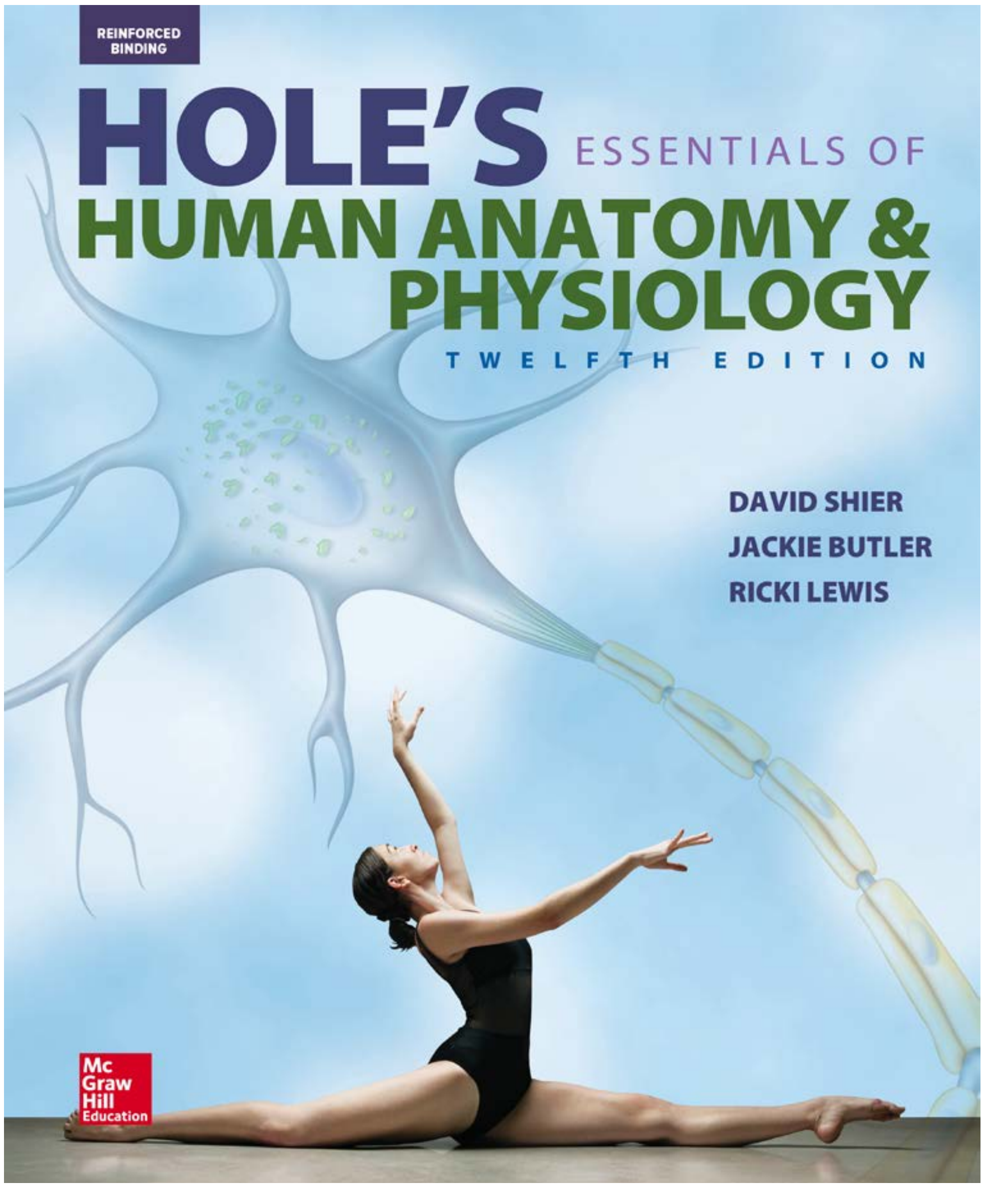
Next Generation Science Standards: Life Science Performance Expectations
CORRELATION GUIDE
for Hole's Essentials of Human Anatomy & Physiology



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Correlation of Next Generation Science Standards,
Life Science Performance Expectations to
***Hole's Essentials of Human Anatomy & Physiology*, (12e)**
by David Shier, Jackie Butler, & Ricki Lewis

Next Generation Science Standards Life Science Performance Expectations	**Hole's Essentials of Human Anatomy & Physiology 12th Edition, ©2015**
HS–LS1 From Molecules to Organisms: Structures and Processes	
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.	*Chapter 2, Chemical Basis of Life*, p. 55; *Chapter 4, Cellular Metabolism*, pp. 94, 96–99; *Genetics Connection—Exome Sequencing*, p. 95; *Figure 4.13, Protein synthesis*, p. 98; *Figure 4.14, Protein synthesis occurs on ribosomes*, p. 100; *Genetics Connection—Inherited Diseases of Muscle*, p. 203; *Genetics Connection—Cystic Fibrosis*, p. 459; *Chapter 20, Pregnancy, Growth, Development, and Genetics*, p. 569
HS–LS1–2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	*Chapter 1, Introduction to Human Anatomy and Physiology*, pp. 12–13, 19, 22–23; *Chapter 1 Assessment*, p. 29 (#4, 19, 20); *Figure 1.3, Parts of the human body*, p. 12; *Figure 1.13, The organ systems in humans interact, maintaining homeostasis*, p. 21; *Chapter 1, Integrative Assessment/Critical Thinking*, p. 30 (#2); *Organization—Integumentary System*, p. 140; *Organization—Skeletal System*, p. 181; *Organization—Muscular System*, p. 218; *Organization—Nervous System*, p.267; *Organization—Endocrine System*, p. 323; *Organization—Cardiovascular System;* p.383
HS–LS1–3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	*Chapter 1, Introduction to Human Anatomy and Physiology, pp. 14–16; Q (Question), p. 15; Chapter 1 Integrative Assessments/Critical Thinking, 30 (#4); Chapter 1 Assessment, p. 29 (#8–11); Figure 1.5, Homeostatic mechanism, p. 14; Figure 1.6, Example of a homeostatic mechanism, p. 15; Figure 1.7, A homeostatic mechanism regulates body temperature, p. 16; Figure 1.8, Organ systems contribute to homeostasis, p. 17; Chapter 6, Integumentary System, pp. 135–136; Chapter 6 Assessment, p. 142 (#15, 16); Chapter 11, Endocrine System, pp. 306–307, 317–319; Figure 11.17, Insulin and glucagon function together to help maintain a relatively stable blood glucose concentration, p. 320; Chapter 13, Cardiovascular System, pp. 370–371; Chapter 13 Assessment, p. 385 (#20); Figure 13.26, Blood pressure, p. 371; Chapter 18, Water, Electrolyte, and Acid–Base Balance, pp. 505, 508–509*

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HS−LS1−4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	*Chapter 3, Cells,* pp. 80, 82; *Chapter 3 Assessment,* p. 85 (#21–23); *Figure 3.22, Mitosis and cytokinesis produce two cells from one,* p. 81; *Figure 3.23, Cells specialize along cell lineage pathways,* p. 82; *Chapter 20, Pregnancy, Growth, Development, and Genetics,* p. 552
HS−LS1−5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	Supporting content: *Energy for metabolic reactions* pages 90–93
HS−LS1−6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon−based molecules.	*Chapter 2, Chemical Basis of Life,* pp. 49–55; *Table 2.22, Organic Compounds in Cells,* p. 56; *Chapter 4, Cellular Metabolism,* pp. 87–88, 98–99; *Figure 4.1, Building up and breaking down of molecules,* p. 88; *Figure 4.3, Peptide bonds link amino acids,* p. 89; *Figure 4.14, Protein synthesis occurs on ribosomes,* p. 100
HS−LS1−7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	*Chapter 4, Cellular Metabolism, pp. 90–93; Chapter 4 Assessment, p. 102 (#14); Figure 4.7, ATP provides energy for metabolic reactions, p. 91; Figure 4.8, A metabolic cycle, p. 92; Figure 4.9, Glycolysis takes place in the cytosol and does not require oxygen, p. 93*

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HS—LS2 Ecosystems: Interactions, Energy, and Dynamics	
HS—LS2—1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	Supporting content: *Requirements of organisms* pages 13–14
HS—LS2—2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	This standard is beyond the scope of the program.
HS—LS2—3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	Supporting content: *Concepts of matter and energy* pages 87–88, 90–93; *Aerobic respiration and anaerobic glycolysis* pages 196–197
HS—LS2—4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Supporting content: *Concepts of matter and energy* pages 87–88, 90–93
HS—LS2—5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	This standard is beyond the scope of the program.
HS—LS2—6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	This standard is beyond the scope of the program.
HS—LS2—7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	Supporting content: *Chapter 4 opener on arsenic poisoning* page 86
HS—LS2—8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	Supporting content: *Reproduction* pages 22–23; *Chapter 11 opener on pheromones and mate selection* page 301; *Reproductive systems* page 519; *Chapter 20 opener on sperm donation* page 549; *Genetics* pages 569–574

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HS—LS3 Heredity: Inheritance and Variation of Traits	
HS—LS3—1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	*Chapter 4, Cellular Metabolism,* p. 94; *Chapter 19, Reproductive System,* pp. 521, 529; *Chapter 20, Pregnancy, Growth, Development, and Genetics,* pp. 569—570; *Figure 19.3, During spermatogenesis, there are two successive meiotic divisions,* p. 522; *Figure 19.8, Oogenesis,* p. 530
HS—LS3—2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	*Clinical Application—Cancer,* p. 79; *Genetic Connection—Exome Sequencing,* p. 95; *Clinical Application—Mutations,* p.97; *Genetics Connection—Inherited Diseases of Muscle,* p. 203; *Genetics Connection—Cystic Fibrosis,* p. 459; *Chapter 20, Pregnancy, Growth, Development, and Genetics,* p. 569
HS—LS3—3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	Supporting content: *Genetics* page 571–574; *Chapter 20 opener on sperm donation page* 549; *Chapter 20—Integrative Assessments/Critical Thinking,* p. 576 (#5)
HS—LS4 Biological Evolution: Unity and Diversity	
HS—LS4—1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	This standard is beyond the scope of the program.
HS—LS4—2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Supporting content: *Reproduction* page 22–23; *Chapter 11 opener on pheromones and mate selection* page 301; *Reproductive systems* page 519; *Chapter 20 opener on sperm donation* page 549; *Genetics* pages 569–574
HS—LS4—3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	Supporting content: *Reproduction* pages 22–23; *Chapter 11 opener on pheromones and mate selection* page 301; *Reproductive systems* page 519; *Chapter 20 opener on sperm donation* page 549; *Genetics* pages 569–574
HS—LS4—4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	This standard is beyond the scope of the program.

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HS−LS4−5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	This standard is beyond the scope of the program.
HS−LS4−6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*	Supporting content: *Chapter 4 opener on arsenic poisoning* page 86