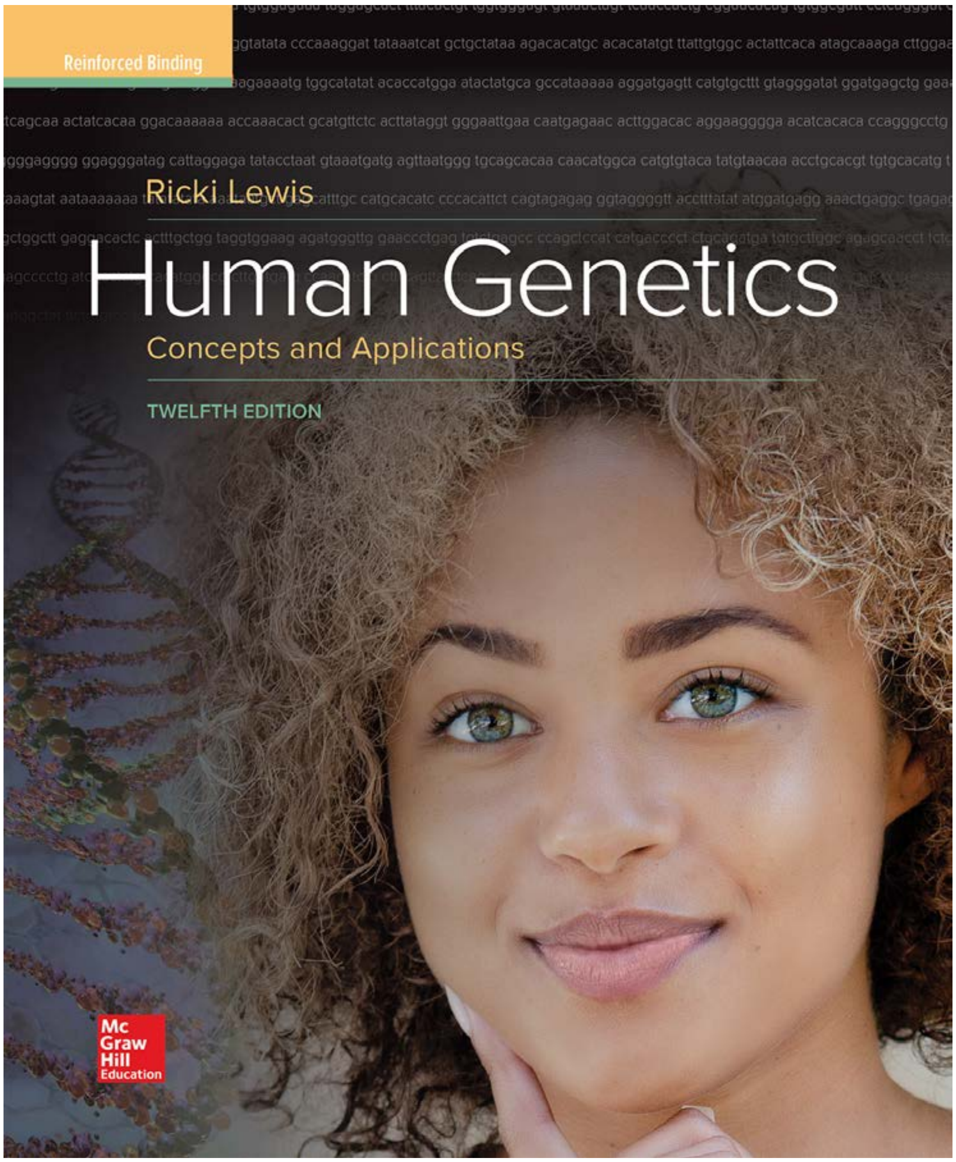
# Next Generation Science Standards: Life Science Performance Expectations

# CORRELATION GUIDE

## for *Human Genetics: Concepts and Applications*




By Ricki Lewis
12th Edition, © 2018
ISBN 978—0—07—680981—1

Correlation of Next Generation Science Standards,
Life Science Performance Expectations to
*Human Genetics: Concepts and Applications,* (12e)
by Ricki Lewis

| Next Generation Science Standards Life Science Performance Expectations | Human Genetics: Concepts and Applications 12th Edition, ©2018 |
|---|---|
| **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. | 2-3, 159-162, 176-186<br>*Applied Questions* 192 (#9)<br>*Key Concepts Questions* 163 (#1, #2), 176 (#2), 182 (#2-#4), 187 (#1-#3)<br>*Review Questions* 173 (#9), 191 (#6, #8-#10) |
| HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. | Development of model not specified, but can be incorporated into the following:<br>2-6<br>*Key Concepts Questions* 6 (#1) |
| HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. | NA |
| HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. | Development of model not specified, but can be incorporated into the following:<br>6, 27-30, 195, 196<br>*Key Concepts Questions* 31 (#3)<br>*Review Questions* 13 (#6), 38 (#11), 191 (#6), 203 (#6) |
| HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. | NA |
| 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. | 17, 163, 182-187<br>*Key Concepts Questions* 26 (#2) |
| 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. | Development of model not specified, but can be incorporated into the following:<br>23 |

| Next Generation Science Standards Life Science Performance Expectations | Human Genetics: Concepts and Applications 12th Edition, ©2018 |
|---|---|
| **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. | NA |
| 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. | NA |
| 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. | NA |
| HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. | NA |
| 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. | NA |
| 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. | NA |
| HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* | Can be incorporated into the following:<br>*Applied Questions* 174 (#1)<br>*Case Studies and Research Results* 174 (#4)<br>*Chapter Opener* 158 |
| HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. | NA |
| **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. | 2-5, 42, 51, 176-187, 230-231<br>*Key Concepts Questions* 2 (#4), 6 (#2, #4)<br>*Review Questions* 13 (#3) |
| 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. | 4, 43, 44, 45, 48-49, 206-208, 280-281<br>*Key Concepts Questions* 45 (#3), 208 (#3), 281 (#1) |

| Next Generation Science Standards Life Science Performance Expectations | Human Genetics: Concepts and Applications 12th Edition, ©2018 |
|---|---|
| HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. | 257-269, 273, 275-277, 279-280, 286<br>*Applied Questions 270 (#6, #7, #3)*<br>*Clinical Connection* 263, 278<br>*Forensics Focus* 270 (#3, #4)<br>*Key Concepts Questions* 260 (#2), 261 (#1), 276 (#1), 281 (#2)<br>*Review Questions 270* (#4. #11) |
| **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. | 6, 295-311<br>*Key Concepts Questions* 6 (#8), 303 (#3), 307 (#1, #2)<br>*Review Questions* 315 (#1) |
| 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. | 257-258, 280-286<br>*Key Concepts Questions* 258 (#4), 281 (#1)<br>*Review Questions* 290 (#9, #12) |
| 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. | 257-258, 281-286<br>*Applied Questions* 291 (#3), 291 (#7)<br>*Review Questions* 290 (#9, #14) |
| HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations. | 281-286<br>*Key Concepts and Questions* 287 (#1)<br>*Review Questions* 290 (#9) |
| 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. | Brief mention of speciation:<br>258 |
| HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.* | Simulation not discussed, but could be incorporated into following:<br>*Applied Questions* 174 (#1)<br>*Case Studies and Research Results* 174 (#4)<br>*Chapter Opener* 158 |
| HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. | Can be incorporated into the following:<br>*Bioethics* 289, 311, 338, 390, 432<br>*Case Studies and Research Results* 14 (#4)<br>*Chapter Opener* 106, 319 |

| Next Generation Science Standards Life Science Performance Expectations | Human Genetics: Concepts and Applications 12th Edition, ©2018 |
| --- | --- |
| HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. | Can be incorporated into the following:<br>397-398<br>*Case Studies and Research Results* 14 (#4), 381 (#1), 382 (#3)<br>*Key Concepts Questions 398 (#3)* |
| HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. | 33-35, 370-373<br>*Applied Questions* 381 (#6)<br>*Bioethics* 35, 338<br>*Review Questions* 380 (#14) |
| HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. | NA |
| 1. Asking questions (for science) and defining problems (for engineering) | Can be incorporated into the following:<br>*Applied Questions* 139 (#9), 400 (#6)<br>*Case Studies and Research Results* 65 (#5), 381-382 (#1, #4, #8) |
| 2. Developing and using models | Text does not address the development of physical models. Pages cited call out areas where models could easily be incorporated (meiosis, mitosis, DNA structure/replication):<br>28-30, 43-45, 163-169 |
| 3. Planning and carrying out investigations | Pages cited refer to planning investigations/studies, text does not have lab component.<br>*Applied Questions* 140 (#7), 381 (#4)<br>*Case Studies and Research Results* 39 (#3), 364 (#9), 382 (#3) |
| 4. Analyzing and interpreting data | 265-269<br>*Applied Questions* 105 (#10), 270 (#7)<br>*Case Studies and Research Results* 140 (#1, #2, #6), 228 (#2), 271 (#2), 293 (#2), 317 (#6)<br>*Forensics Focus* 271 (#6) |
| 5. Using mathematics and computational thinking | 73, 76-77, 98-102, 115, 259-261, 265-268<br>*Applied Questions* 105 (#10), 122 (#1), 270 (#8)<br>*Case Studies and Research Results* 84 (#3), 123 (#2), 271 (#2)<br>*Forensics Focus* 271 (#6) |
| 6. Constructing explanations (for science) and designing solutions (for engineering) | 367-379<br>*Applied Questions* 381 (#1), 400 (#6), 381 (#10)<br>*Case Studies and Research Results* 381 (#1), 400 (#5)<br>*Clinical Connection* 126-127<br>*Key Concepts Questions* 373, 375, 379 |

| Next Generation Science Standards Life Science Performance Expectations | Human Genetics: Concepts and Applications 12th Edition, ©2018 |
|---|---|
| 7. Engaging in argument from evidence | *Applied Questions* 65 (#2), 416 (#12)<br>*Bioethics* 11-12, 171, 242, 289, 371, 410, 432<br>*Case Studies and Research Results* 65 (#3), 140 (#2)<br>*Clinical Connection* 396-397<br>*Review Questions* 38 (#16) |
| 8. Obtaining, evaluating, and communicating information | End-of-chapter exercises offer numerous opportunities for evaluating and communicating information:<br>*Applied Questions* 38 (#1), 65 (#10), 83 (#2), 140 (#4), 204 (#2)<br>*Bioethics* 96, 268<br>*Case Studies and Research Results* 84 (#2)<br>*Forensics Focus* 14 (#1), 105 (#1), 157 (#1)<br>*Review Questions* 103 (#7), 139 (#5) |
| 1. Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. | 6, 295-311<br>*Case Studies and Research* 317-318 (#4, #7)<br>*Key Concepts Questions* 6 (#8), 303 (#3), 307 (#1, #2)<br>*Review Questions* 315 (#1) |
| 2. Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts. | 194-195, 197-199, 274-277, 279-282, 323-328, 339<br>*Applied Questions* 204 (#5), 291 (#3)<br>*Key Concepts Questions* 199 (#1-#3)<br>*Review Questions* 203 (#5) |
| 3. Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance. | 2-6, 16-17, 19-26, 257-260, 273-277, 279-286<br>*Key Concepts Questions* 6 (#1), 287 (#2, #3)<br>*Review Questions* 13 (#1, #6) |
| 4. Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering. | Can be incorporated into the following with view of DNA translation/transcription as a system.<br>176-186, 197-199, 367-373, 375-379<br>*Case Studies and Research Results* 381 (#1, #7)<br>*Key Concepts Questions* 373 (#1, #2), 379 (#1-#3)<br>*Review Questions* 191 (#5), 380 (#5) |
| 5. Energy and matter: Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. | Can be incorporated into the following:<br>23 |

| **Next Generation Science Standards Crosscutting Concepts** | **Human Genetics: Concepts and Applications 12th Edition, ©2018** |
|---|---|
| 6. Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions. | 17-, 19-26, 163-167, 178-179, 184-187, 194-195, 325<br>*Key Concepts Questions* 26 (#5, #6), 328 (#3)<br>*Review Questions* 173 (#5) |
| 7. Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study. | 257-261, 273-277, 279-286<br>*Key Concepts Questions* 258 (#3, #4), 260 (#1-#3), 276 (#1), 280 (#1, #2), 287 (#1-#3)<br>*Review Questions* 270 (#3), 290 (#2, #9) |