























Biology 114 Learning Outcomes – Biology: The Core 3e

1	+	Evaluate the scientific validity of different types of information.	
2	+	Global: Demonstrate the ability to think critically and employ critical thinking skills.	2
3	+	Global: Read and interpret models, graphs and data.	
4	+	Describe the properties of life common to all living things.	
5	+	Differentiate between the hierarchical levels of biological organization studied by biologists, and recognize the major themes that underlie the study of biology at all levels.	
6	+	Global: Demonstrate an understanding of the principles of scientific inquiry.	1
7	+	Outline the overall process used by scientists to study science, and describe the different approaches used by scientists to study the natural world.	
8	+	Describe how scientists design controlled experiments to generate data, and how they visualize data to reach reliable conclusions.	
9	+	Global: Apply the scientific method to interpret information and draw conclusions.	
10	+	Global: Demonstrate an understanding of the impact of science on society.	2
11	+	Global: Demonstrate the quantitative skills needed to succeed in Introductory biology.	
12	+	Global: Evaluate the credibility of scientific information from various sources.	
13	+	Global: Communicate effectively in writing.	
14	+	Differentiate between atoms, elements and molecules and describe how atoms participate in reactions essential to life.	1
15	+	Illustrate the different types of chemical bonds that can form between atoms.	
16	+	Explain the unique chemical properties of water molecules and how these properties are essential to life.	
17	+	Describe in specific terms the forms and functions of the four classes of biological macromolecules, including their monomers.	1
18	+	Describe the significance of carbon in forming the basis of the four classes of biological macromolecules, and differentiate between hydrolysis and dehydration synthesis reactions as processes of metabolism.	
19	+	Global: Demonstrate the ability to make connections between concepts across biology.	4
20	+	Explain the similarities and differences between prokaryotic and eukaryotic cells, and between plant and animal eukaryotic cells.	
21	+	Explain the source and significance of the hydrophobic and hydrophilic nature of the plasma membrane and how the plasma membrane regulates the passage of materials.	
22	+	Describe the structure of the eukaryotic nucleus and its contents, including chromosomes.	

Biology 114 Learning Outcomes – Biology: The Core 3e

23	 Summarize the major steps involved in protein synthesis, including the structures, locations of, and molecules involved in transcription, translation, and distribution of proteins.
24	 List the components of a cell that provide energy, structural strength, mobility, and connectivity to other cells.
25	 Describe how energy flows through an ecosystem, including conversions from one form of energy to another.
26	 Describe the overall process of photosynthesis, including the cellular structures and locations involved.
27	 Relate producers and consumers to photosynthesis and cellular respiration by describing how energy and matter flow between the two processes.
28	 Describe the two sets of reactions involved in photosynthesis, including the molecules that act as the inputs and outputs, and the molecules used to bridge them.
29	 Describe the overall process of cellular respiration, including the cellular structures and locations involved.
30	 Describe the three stages of cellular respiration, including the molecules that act as the inputs and outputs of each stage, and the structures involved.
31	 Describe how the process of fermentation produces energy in different species.
32	 Differentiate between sexual and asexual reproduction.
33	 Outline the events of each phase of the cell cycle, from interphase to cytokinesis, in both plant and animal cells.
34	 Describe the basic structure and function of chromosomes.
35	 Compare and contrast mitosis and meiosis.
36	 Outline the process of gamete production, differentiating between the events of meiosis I and meiosis II, and relate these processes to the creation of genetic variation during sexual reproduction.
37	 Explain how nondisjunction can result in whole chromosomal abnormalities.
38	 Summarize the process of cloning and how it is linked to cell division.
39	 Describe the inheritance patterns for strict dominant and recessive alleles as described by Mendel.
40	 Trace traits across multiple generations using a genetic pedigree.
41	 Distinguish between the various inheritance patterns that do not follow Mendel's model, including sex-linked traits.
42	 Describe how certain mutations can result in cancer, and what can be done to prevent or treat cancer.
43	 Describe the structure of the DNA molecule and how this structure allows for the storage of information, the replication of DNA, and protein synthesis.
44	

Biology 114 Learning Outcomes – Biology: The Core 3e

	Describe the process of DNA replication, including the enzymes necessary for replication to occur.
45	+ List the similarities and differences between the various nucleic acid molecules.
46	+ Describe the process of protein synthesis, including how the genetic information is transferred during transcription and translation.
47	+ Define the control of gene expression, and describe the various ways cells are able to regulate gene expression, including signal transduction.
48	+ Summarize the practice of gene therapy in medicine.
49	+ Differentiate between the categories of mutations and the relative effects of each on the expression of genes.
50	+ Describe how scientists manipulate DNA to produce genetically modified products or organisms.
51	+ Describe how scientists can sequence genome and analyze DNA profiles, and how this information is applied.
52	+ Define evolution, and explain the different mechanisms that can result in evolution.
53	+ Summarize the cultural and scientific contexts that led to Darwin's development and publishing of his hypotheses.
54	+ Describe how the process of evolution by natural selection works, and how it results in adaptations.
55	+ Differentiate between the processes and results of microevolution and macroevolution, and explain how they contribute to speciation.
56	+ Describe examples of and evidence for the theory of evolution by natural selection.
57	+ Describe how scientists classify organisms and construct phylogenies to represent how organisms are related.
58	+ Relate the geologic history of the planet to evolutionary history, including mass extinctions and subsequent diversification.
59	+ Define a species and describe the barriers that help maintain species.
60	+ Outline the conditions required and steps involved in the biogenesis hypothesis of the origin of life.
61	+ Describe prokaryotic cellular structure and diversity, highlighting the differences and similarities between archaea and bacteria.
62	+ Explain how bacteria are mostly beneficial to environments, and present exceptions where bacteria are human pathogens.
63	+ Explain the ways by which genetic material can be transferred between bacteria.
64	+ Explain how viruses are nonliving parasites, and give examples of how viruses (including HIV) and other infectious molecules (prions and viroids) infect cells and reproduce.
65	+ Describe the origin of eukaryotic organisms via endosymbiosis, including the role of protists in the

Biology 114 Learning Outcomes – Biology: The Core 3e

	origin of multicellularity, and present the diversity of protists.
66	<input type="checkbox"/> Place fungi within the eukaryotic kingdom, and explain their ecological roles.
67	<input type="checkbox"/> Describe the structure and reproductive strategies of fungi, including their life cycle.
68	<input type="checkbox"/> Summarize the evolution of plants in adapting to a terrestrial environment.
69	<input type="checkbox"/> Describe the physiological structures of plants and link them to their functions.
70	<input type="checkbox"/> Draw the phylogeny containing the four major plant groups, and outline the distinguishing adaptations of the four major plant groups.
71	<input type="checkbox"/> Outline the various reproductive strategies that different groups of plants employ.
72	<input type="checkbox"/> Describe the anatomy of angiosperms, including the roles of seeds and fruits in reproduction.
73	<input type="checkbox"/> Describe the different growing strategies employed by angiosperms.
74	<input type="checkbox"/> Summarize the evolutionary origins of animals, and describe the adaptations that distinguish the animal kingdom from other kingdoms.
75	<input type="checkbox"/> Describe the nine major branches in the phylogeny of animals, emphasizing the adaptations that distinguish each branch.
76	<input type="checkbox"/> Describe the anatomical and physiological characteristics of the chordate phylum, including the key adaptations of subgroups (notably fish, amphibians, reptiles and mammals).
77	<input type="checkbox"/> Outline the evolutionary relationships and key distinguishing characteristics of the major groups of mammals (notably primates)
78	<input type="checkbox"/> Outline the structural hierarchy of the human body systems, with particular emphasis on the different types of tissues.
79	<input type="checkbox"/> Explain homeostasis by means of metabolic feedback.
80	<input type="checkbox"/> Describe the main organs of the digestive system (including the alimentary canal and the accessory organs), and explain how food is processed in four stages.
81	<input type="checkbox"/> Discuss what constitutes proper nutrition, and describe problems associated with nutritional imbalances.
82	<input type="checkbox"/> Describe the main organs of the respiratory system with emphasis on how gases are exchanged between the body and the external environment.
83	<input type="checkbox"/> Describe the main organs, vessels, and tissues of the circulatory system and how they function to transport blood throughout the body.
84	<input type="checkbox"/> Describe the main components of the immune system, and explain how they prevent and fight infections, including the role of lymphocytes in specific immunity and examples of immune malfunction.
85	<input type="checkbox"/> Describe the main organs of the endocrine system, and explain how hormones act on the body.
86	<input type="checkbox"/> Describe the main organs of the urinary system, and explain how kidneys filter and eliminate wastes

Biology 114 Learning Outcomes – Biology: The Core 3e

	from the blood.
87	<input type="checkbox"/> Describe the main organs of the reproductive system, and explain how the male and female systems produce gametes.
88	<input type="checkbox"/> Outline the stages in human development, from conception to delivery, and discuss issues related to reproductive health, contraception, and sexually transmitted diseases.
89	<input type="checkbox"/> Describe the main organs, components, and divisions of the nervous system, and explain how nerve cells, including sensory receptors, transmit signals throughout the body.
90	<input type="checkbox"/> List and describe the main components of skeletal system, and explain how a muscle is able to contract and produce movement.
91	<input type="checkbox"/> Define ecology and outline the five levels at which it is studied.
92	<input type="checkbox"/> Describe the key abiotic factors that affect ecosystems.
93	<input type="checkbox"/> Explain how populations can vary in density, dispersion, demographics (including age structure and survivorship curves) and growth (including the models used to predict changes in population sizes).
94	<input type="checkbox"/> Describe the main interactions between species.
95	<input type="checkbox"/> Outline how energy enters and flows through the trophic levels of an ecosystem
96	<input type="checkbox"/> Describe the role humans play in habitat destruction, invasive species, and conservation.
97	<input type="checkbox"/> Describe how biodiversity and relative abundance are measured on various levels, and how these parameters are used in evaluating the health and diversity of an ecosystem.
98	<input type="checkbox"/> Identify the distinctive factors of the major aquatic and terrestrial biomes, and identify what factors distinguish each.
99	<input type="checkbox"/> Outline how water and chemical nutrients cycle through an ecosystem.