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Campbell BIOLOGY in Focus
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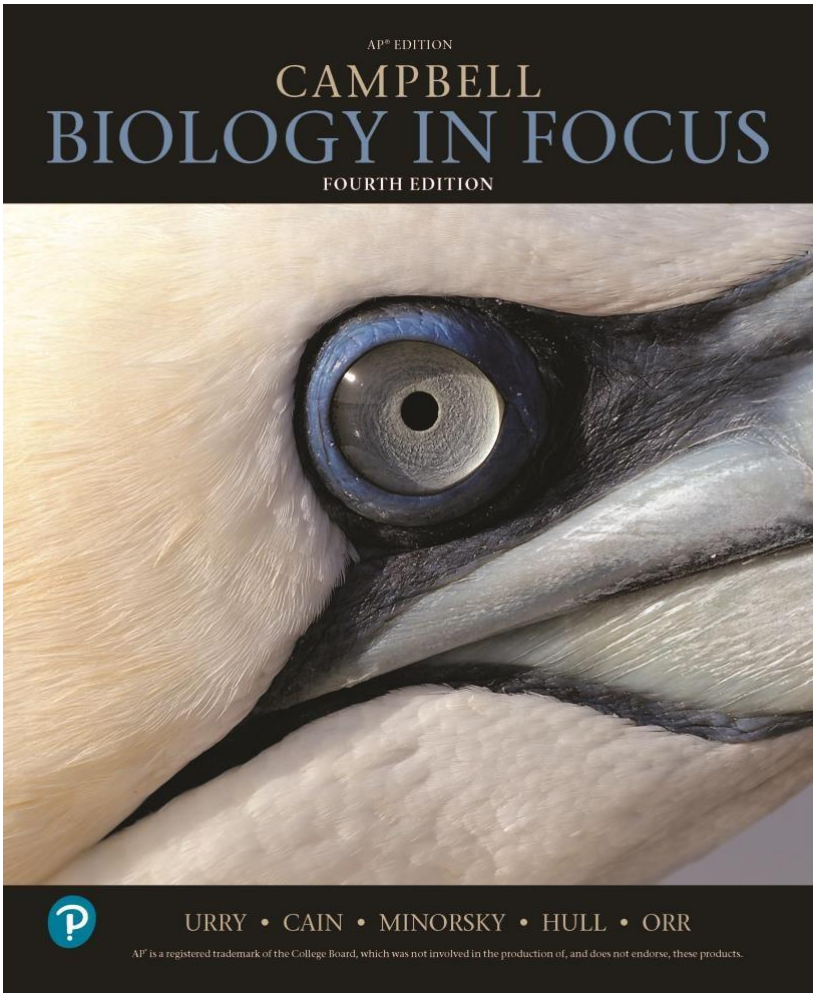

To the

AP® Biology Curriculum Framework Effective Fall 2020

Pearson

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Big Idea Summary

Big Idea 1: Evolution (EVO)

The process of evolution drives the diversity and unity of life.

Evolution is a change in the genetic makeup of a population over time, with natural selection as its major driving mechanism. Darwin's theory, which is supported by evidence from many scientific disciplines, states that inheritable variations occur in individuals in a population. Due to competition for limited resources, individuals with more favorable genetic variations are more likely to survive and produce more offspring, thus passing traits to future generations. A diverse gene pool is vital for the survival of species because environmental conditions change. The process of evolution explains the diversity and unity of lif e, but an explanation about the origin of life is less clear.

In addition to the process of natural selection, naturally occurring catastrophic and human-induced events, as well as random environmental changes can result in alteration in the gene pools of populations. Scientific evidence supports that speciation and extinction have occurred throughout Earth's history and that life continues to evolve within a changing environment, thus explaining the diversity of lif e.

Big Idea 2: Energetics (ENE)

Biological systems use energy and molecular building blocks to grow, to reproduce, and maintain dynamic homeostasis.

Cells and organisms must exchange matter with the environment. Organisms respond to changes in their environment at the molecular, cellular, physiological, and behavioral levels. Living systems require energy and matter to maintain order, to grow, and to reproduce. Organisms employ various strategies to capture, use, and store energy and other vital resources. Energy deficiencies are not only detrimental to individual organisms; they also can cause disruptions at the population and ecosystem levels. Homeostatic mechanisms that are conserved or divergent across related organisms reflect either continuity due to common ancestry or evolutionary change in response to distinct selective pressures.

Big Idea 3: Information Storage and Transmission (IST)

Living systems store, retrieve, transmit, and respond to information essential to life processes. Genetic inf ormation provides for continuity of life and, in most cases, this information is passed from parent to offspring via DNA. Nonheritable information transmission influences behavior within and between cells, organisms, and populations. These behaviors are directed by underlying genetic inf ormation, and responses to information are vital to natural selection and evolution. Genetic information is a repository of instructions necessary for the survival, growth, and reproduction of the organism. Genetic variation can be advantageous for the long-term survival and evolution of a species.

Big Idea 4: Systems Interactions (SYI)

Biological systems interact, and these systems and their interactions exhibit complex properties. All biological systems comprise parts that interact with one another. These interactions

result in characteristics and emergent properties not found in the individual parts alone. All biological systems from the molecular level to the ecosystem level exhibit properties of biocomplexity and diversity. These two properties provide robustness to biological systems, enabling greater resiliency and flexibility to tolerate and respond to changes in the environment.

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Unit 1: Chemistry of Life (6 Topics)		
1.1 Structure of Water and Hydrogen Bonding	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	Chapter 2: The Chemical Context of Life Concept 2.3: The f ormation and function of molecules depend on chemical bonding between atoms Concept 2.5: Hydrogen bonding gives water properties that help make life possible on Earth
1.2 Elements of Life	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.1: Carbon atoms can form diverse molecules by bonding to four other atoms
1.3 Introduction to Biological Macromolecules	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.2: Macromolecules are polymers, built f rom monomers
1.4 Properties of Biological Macromolecules	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.3: Carbohydrates serve as fuel and building material Concept 3.4: Lipids are a diverse group of hydrophobic molecules Concept 3.5: Proteins include a diversity of structures, resulting in a wide range of f unctions Concept 3.6: Nucleic acids store, transmit, and help express heredity information
1.5 Structure and Function of Biological Macromolecules	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.3: Carbohydrates serve as fuel and building material Concept 3.5: Proteins include a diversity of structures, resulting in a wide range of f unctions Concept 3.6: Nucleic acids store, transmit, and help express heredity information

1.6 Nucleic Acids	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.6: Nucleic acids store, transmit, and help express hereditary information

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Unit 2: Cell Structure and Function (11 topics)		
2.1 Cell Structure Subcellular Components	SYI-1: Living systems are organized in a hierarchy of structure of levels that interact	Chapter 4: A Tour of the Cell Concept 4.2: Eukaryotic cells have internal membranes that compartmentalize their f unctions
2.2 Cell Structure and Function	SYI-1: Living systems are organized in a hierarchy of structure of levels that interact	Chapter 4: A Tour of the Cell Concept 4.3: The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes Concept 4.4: The endomembrane system regulates protein traffic and performs metabolic functions Concept 4.5: Mitochondria and chloroplasts change energy from one form to another Concept 4.6: The cytoskeleton is a network of fibers that organizes structures and activities in the cell
2.3 Cell Size	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 4: A Tour of the Cell Concept 4.2: Eukaryotic cells have internal membranes that compartmentalize their f unctions Figure 4.6: Geometric relationships between surf ace area and volume. Concept 4.8: A cell is greater than the sum of its parts. Appendix C: The Metric System
2.4 Plasma Membranes	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 4: A Tour of the Cell Concept 4.2: Eukaryotic cells have internal membranes that compartmentalize their f unctions Chapter 5: Membrane Transport and Cell Signaling Concept 5.1: Cellular membranes are f luid mosaics of lipids and proteins

2.5 Membrane Permeability	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.2: Membrane structure results in selective permeability Chapter 4: A tour of the Cell Concept 4.7: Extracellular components and connections between cells help coordinate cellular activities

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2.6 Membrane Transport	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.3: Passive transport is diffusion of a substance across a membrane with no energy investment Concept 5.4: Active transport uses energy to move solutes against their gradients Concept 5.5: Bulk transport across the plasma membrane occurs by exocytosis and endocytosis
2.7 Facilitated Diffusion	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.3: Passive transport is diffusion of a substance across a membrane with no energy investment Concept 5.4: Active transport uses energy to move solutes against their gradients
2.8 Tonicity and Osmoregulation	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.3: Passive transport is diffusion of a substance across a membrane with no energy investment Chapter 29: Resource Acquisition, Nutrition and Transport in Vascular Plants Concept 29.5: Transpiration drives the transport of water and minerals from roots to shoots via the xylem

2.9 Mechanisms of Transport	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.3: Passive transport is diffusion of a substance across a membrane with no energy investment Concept 5.4: Active transport uses energy to move solutes against their gradients Concept 5.5: Bulk transport across the plasma membrane occurs by exocytosis and endocytosis

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2.10 Compartmentalization	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	Chapter 4: A Tour of the Cell Concept 4.2: Eukaryotic cells have internal membranes that compartmentalize their f unctions Concept 4.4: The endomembrane system regulates protein traffic and performs metabolic functions Concept 4.5: Mitochondria and chloroplasts change energy from one form to another
2.11 Origins of Cell Compartmentalization	EVO-1: Evolution is characterized by a change in the genetic makeup of population over time and is supported by multiple lines of evidence.	Chapter 25: The Origin and Diversification of Eukaryotes Concept 25.1: Eukaryotes arose by endosymbiosis more than 1.8 billion years ago Chaapter 24: Early Life and the Diversification of Prokaryotes Concept 24.2: Diverse structural and metabolic adaptations have evolved in porkaryotes
Unit 3: Cellular Energetics (7 Topics)		

3.1 Enzyme Structure	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 3: Carbon and the Molecular Diversity of Life Chapter 6: An Introduction to Metabolism Concept 6.1: An organism's metabolism transforms matter and energy Concept 6.4: Enzymes speed up metabolic reactions by lowering energy barriers
3.2 Enzyme Catalysis	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 6: An introduction to Metabolism Concept 6.1: An organism's metabolism transforms matter and energy Concept 6.4: Enzymes speed up metabolic reactions by lowering energy barriers
3.3 Environmental Impacts on Enzyme Function	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 6: An Introduction to Metabolism Concept 6.4: Enzymes speed up metabolic reactions by lowering energy barriers Concept 6.5: Regulation of enzyme activity helps control metabolism

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3.4 Cellular Energy	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 6: An introduction to Metabolism Concept 6.1: An organism's metabolism transforms matter and energy Chapter 7: Cellular Respiration and Fermentation Concept 7.1: Catabolic pathways yield energy by oxidizing organic fuels

3.5 Photosynthesis	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 8: Photosynthesis
3.6 Cellular Respiration	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 7: Cellular Respiration and Fermentation
3.7 Fitness	SYI-1: Naturally occurring diversity among and between components within biological systems af f ects interactions with the environment.	Chapter 34: Circulation and Gas Exchange Concept 34.7: Adaptations for gas exchange include pigments that bind and transport gases Chapter 8: Photosynthesis Concept 8.3: The light reactions convert solar energy to the chemical energy of ATP and NADPH

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Unit 4: Cell Communication and Cell Cycle (7 Topics)		

4.1 Cell Communication	IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.6: The plasma membrane plays a key role in most cell signaling
4.2 Introduction to Signal Transduction	IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.6: The plasma membrane plays a key role in most cell signaling
4.3 Signal Transduction	IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.6: The plasma membrane plays a key role in most cell signaling
4.4 Changes in Signal Transduction Pathways	IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	Chapter 5: Membrane Transport and Cell Signaling Concept 5.6: The plasma membrane plays a key role in most cell signaling
4.5 Feedback	ENE-3: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 6: An introduction to Metabolism Concept 6.5: Regulation of enzyme activity helps control metabolism Chapter 32: The Internal Environment of Animals: Organization and Regulation Concept 32.2: The endocrine and nervous systems act individually and together in regulating animal physiology Concept 32.3: Feedback control maintains the internal environment in many animals Chapter 33: Animal Nutrition Concept 33.5: Feedback circuits regulate digestion, energy allocation, and appetite

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4.6 Cell Cycle	IST-1: Heritable inf ormation provides for continuity of life	Chapter 9: The cell cycle Overview: The Key Roles of Cell Division Concept 9.1 Most cell division results in genetically identical daughter cells Concept 9.2: The mitotic phase alternates with interphase in the cell cycle
4.7 Regulation of Cell Cycle	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 9: The Cell Cycle Concept 9.3: The eukaryotic cell cycle is regulated by a molecular control system Chapter 16: Development, Stem Cells, and Cancer Concept 16.3: Abnormal regulation of genes that af fect the cell cycle can lead to cancer
Unit 5: Heredity (6 Topics)		
5.1 Meiosis	IST-1: Heritable inf ormation provides for continuity of life	Chapter 10: Meiosis and Sexual Life Cycles Concept 10.1: Offspring acquire genes from parents by inheriting chromosomes Concept 10.2: Fertilization and meiosis alternate in sexual life cycles Concept 10.3: Meiosis reduces the number of chromosomes sets from diploid to haploid
5.2 Meiosis and Genetic Diversity	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 10: Meiosis and Sexual Life Cycles Concept 10.3: Meiosis reduces the number of chromosomes sets from diploid to haploid Concept 10.4: Genetic variation produced in sexual lif e cycles contributes to evolution
5.3 Mendelian Genetics	EVO-2: Organisms are linked by lines of descent f rom common ancestry. IST-1: Heritable inf ormation provides for continuity of life.	Chapter 11: Mendel and the Gene Idea
5.4 Non-Mendelian Genetics	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 12: The Chromosomal Basis of Inheritance

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5.5 Environmental Effects on Phenotype	SYI-3: Naturally occurring diversity among and between components within biological systems af f ects interactions with the environment.	Chapter 11: Mendel and the Gene Idea Concept 11.3: Inheritance patterns are often more complex than predicted by simple Mendelian genetics
5.6 Chromosomal Inheritance	SYI-3: Naturally occurring diversity among and between components within biological systems af f ects interactions with the environment.	Chapter 11: Mendel and the Gene Idea Concept 11.4: Many human traits follow Mendelian patterns of inheritance
Unit 6: Gene Expression and Regulation (8 Topics)		
6.1 DNA and RNA Structure	IST-1: Heritable inf ormation provides for continuity of life	Chapter 3: Carbon and the Molecular Diversity of Life Concept 3.6: Nucleic acids store, transmit, and help express hereditary information Chapter 13: The Molecular Basis of Inheritance Concept 13.1: DNA is the genetic material
6.2 Replication	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 13: The Molecular Basis of Inheritance Concept 13.2: Many proteins work together in DNA replication and repair
6.3 Transcription and RNA Processing	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 14: Gene Expression: From Gene to Protein Concept 14.1: Genes specify proteins via transcription and translation Concept 14.2: Transcription is the DNA-directed synthesis of RNA: A Closer Look Concept 14.3: Eukaryotic cells modify RNA af ter transcription
6.4 Translation	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 14: Gene Expression: From Gene to Protein Concept 14.4: Translation is the RNA-directed synthesis of a polypeptide: A Closer Look

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6.5 Regulation of Gene Expression	IST-2: Differences in the expression of genes account for some of the phenotypic differences between organisms	Chapter 15: Regulation of Gene Expression Chapter 15.1: Bacteria often respond to environmental change by regulating transcription Concept 15.2: Eukaryotic gene expression is regulated at many stages
6.6 Gene Expression and Cell Specialization	IST-2: Differences in the expression of genes account for some of the phenotypic differences between organisms	Chapter 15: Regulation of Gene Expression Concept 15.3: Noncoding RNAs play multiple roles in controlling gene expression Concept 15.4: Researchers can monitor expression of specific genes
6.7 Mutations	IST-2: Differences in the expression of genes account for some of the phenotypic differences between organisms. IST-4: The processing of genetic information is imperf ect and is a source of genetic variation.	Chapter 14: Gene Expression: From Gene to Protein Concept 14.5: Mutations of one or a f ew nucleotides can affect protein structure and f unction Chapter 11: Mendel and the Gene Idea Concept 11.4: Many human traits follow Mendelian patterns of inheritance

6.8 Biotechnology	IST-1: Heritable inf ormation provides for continuity of life.	Chapter 3: Carbon and the Molecular Diversity of life: Concept 3.7: Genomics and proteomics have transformed biological inquiry and applications Chapter 13: The Molecular Basis of Inheritance Concept 13.4: Understanding DNA structure and replication makes genetic engineering possible Chapter 15: Regulation of Gene Expession Concept 15.4: Researchers can monitor expression of specific genes Chapter 16: Development, Stem Cells, and Cancer Concept 16.2: Cloning of organisms showed that differentiated cells could be “reprogrammed” and ultimately led to the production of stem cells Chapter 18: Genomes and Their Evolution Chapter 24: Early Life and the Diversification of Prokaryotes Concept 24.5: Prokaryotes play crucial roles in the biosphere Chapter 30: Reproduction and Domestication of Flowering Plants
		Concept 30.3: People modify crops through breeding and genetic engineering

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Unit 7 Natural Selection (13 Topics)		
7.1 Introduction to Natural Selection	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Chapter 19: Decent with Modification Concept 19.1: The Darwinian revolution challenged traditional views of a young Earth inhabited by unchanging species Concept 19.2: Descent with modifications by natural selection explains the adaptations of organisms and the unity and diversity of life Concept 19.3: Evolution is supported by an overwhelming amount of scientific evidence
7.2 Natural Selection	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Chapter 21: The Evolution of Populations Overview: The Smallest Unit of Evolution Concept 21.1: Genetic variation makes evolution possible Concept 21.4: Natural selection is the only mechanism that consistently causes adaptive evolution Figure 21.15: The Sickle-Cell Allele
7.3 Artificial Selection	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Chapter 19: Descent with Modification Concept 19.2: Descent with modification by natural selection explains the adaptations of organisms and the unity and diversity of life Concept 19.3: Evolution is supported by an overwhelming amount of scientific evidence
7.4 Population Genetics	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Chapter 21: The Evolution of Populations Overview: The Smallest Unit of Evolution Concept 21.1: Genetic variation makes evolution possible Concept 21.3: Natural selection genetic drif t, and gene flow can alter allele f requencies in a population

7.5 Hardy-Weinberg Equilibrium	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	Chapter 21: The Evolution of Populations Concept 21.2: The Hardy-Weinberg equation

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7.6 Evidence of Evolution	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence. EVO-2: Organisms are linked by lines of descent f rom common ancestry	Chapter 1: Introduction: Evolution and the Foundations of Biology Concept 1.1: The study of life reveals unifying themes Concept 1.2: The Core Theme: Evolution accounts for the unity and diversity of life Chapter 3: Carbon And The Molecular Diversity of Life Concept 3.7: Genomics and proteomics have transformed biological inquiry and applications Chapter 19: Descent with Modification Concept 19.3: Evolution is supported by an overwhelming amount of scientific evidence Chapter 17: Viruses Concept 17.3: Viruses and prions are formidable pathogens in animals and plants Chapter 23: Broad Patterns of Evolution Scientific Skills Exercise: Analyzing a Sequence-Based Phylogenetic Tree to Understand Viral Evolution
7.7 Common Ancestry	EVO-2: Organisms are linked by lines of descent f rom common ancestry	Chapter 4: A Tour of the Cell Concept 4.2: Eukaryotic cells have internal membranes that compartmentalize their f unctions Concept 4.5: Mitochondria and chloroplasts change energy from one form to another Chapter 24: Early life and the Diversification of Prokaryotes Concept 24.2: Diverse structural and metabolic adaptations have evolved in prokaryotes Chapter 25: The Origin and Diversification of Eukaryotes Concept 25.1: Eukaryotes arose by endosymbiosis more than 1.8 billion years ago

7.8 Continuing Evolution	EVO-3: Life Continues to evolve within a changing environment.	Chapter 19: Descent with Modification Concept 19.2: Descent with modification by natural selection explains the adaptations of organisms and the unity and diversity of life Concept 19.3: Evolution is supported by an overwhelming amount of scientific evidence
7.9 Phylogeny	EVO-3: Life continues to evolve within a changing environment	Chapter 20: Phylogeny

7.10 Speciation	EVO-3: Life continues to evolve within a changing environment	Chapter 22: The Origin of Species

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7.11 Extinction	EVO-3: Life continues to evolve within a changing environment	Chapter 19: Descent with Modification Concept 19.3: Evolution is supported by an overwhelming amount of scientific evidence Chapter 23: Broad Patterns of Evolution Concept 23.2: The rise and fall of groups of organisms reflect differences in speciation and extinction rates Chapter 43: Conservation Biology and Global Change
7.12 Variations in Populations	SYI-3: Naturally occurring diversity among and between components within biological systems affects interactions with the environment	Chapter 43: Conservation Biology and Global Change Concept 43.1: Human activities threaten Earth's biodiversity Concept 43.2: Population conservation focuses on population size, genetic diversity, and critical habitat

7.13 Origins of Life on Earth	SYI-3: Naturally occurring diversity among and between components within biological systems af fects interactions with the environment	Chapter 24: Early Life and the Diversification of Prokaryotes Overview: The First Cells Concept 24.1: Conditions on early Earth made the origin of life possible

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Unit 8: Ecology (7 Topics)		

8.1 Responses to the Environment	ENV-3: Timing and coordination of biological mechanisms involved in growth, reproduction, and homeostasis depend on organisms responding to environmental cues. IST-5: Transmission of information results in changes within and between biological systems. IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	Chapter 31: Plant Responses to Internal and External Signals Chapter 32: The internal Environment of Animals: Organization and Regulation Concept 32.2: The endocrine and nervous systems act individually and together in regulating animal physiology Concept 32.3: Feedback control maintains the internal environment in many animals Chapter 39: Motor Mechanisms and Behavior Concept 39.3: Discrete sensory inputs can stimulate both simple and complex behaviors Concept 39.5: Selection for individual survival and reproductive success can explain diverse behaviors
8.2 Energy Flow Through Ecosystems	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	Chapter 41: Ecological Communities Concept 41.2: Biological communities can be characterized by their diversity and trophic structure Chapter 42: Ecosystems and Energy Concept 42.1: Physical laws govern energy f low and chemical cycling in ecosystems Concept 42.2: Energy and other limiting f actors control primary production in ecosystems Concept 42.3: Energy transfer between trophic levels is typically on 10% efficient Chapter 40: Population Ecology and the Distribution of Organisms Concept 40.6: Population dynamics are inf luenced strongly by life history traits and population density Chapter 33: Animal Nutrition Concept 33.5: Feedback circuits regulate digestion, energy allocation and appetite

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8.3 Population Ecology	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	Chapter 40: Population Ecology and the Distribution of Organisms Concept 40.4: Biotic and abiotic factors af fect population density, dispersion, and demographics Concept 40.5: The exponential and logistic models describe the growth of populations
8.4 Effect of Density of Populations	SYI-1: Living systems are organized in a hierarchy of structural levels that interact IST-1: Heritable inf ormation provides for continuity of life.	Chapter 40: Population Ecology and the Distribution of Organisms Concept 40.4: Biotic and abiotic factors af fect population density, dispersion, and demographics Concept 40.5: The exponential and logistic models describe the growth of populations Concept 40.6: Population dynamics are Influenced strongly by life history traits and population density
8.5 Community Ecology	ENE-4: Communities and ecosystems change on the basis of interactions among populations and disruptions to the environment	Chapter 41: Ecological Communities Concept 41.4: Interactions between species may help, harm, or have no effect on the individuals involved Concept 41.2: Biological communities can be characterized by their diversity and trophic structure (includes Shannon diversity index)
8.6 Biodiversity	SYI-3: Naturally occurring diversity among and between components within biological systems affects interactions with the environment.	Chapter 41: Ecological Communities Concept 41.2: Biological communities can be characterized by their diversity and trophic structure (includes Shannon diversity index
8.7 Disruptions to Ecosystems	EVO-1: Evolution is characterized by change in the genetic make-up of a population over time and is supported by multiple lines of evidence	Chapter 41: Ecological Communities Concept 41.3: Disturbance influences species diversity and composition Concept 41.4: Biogeographic factors affect community diversity Concept 41.5: Pathogens alter community structure locally and globally Chapter 17: Viruses Concept 17.3: Viruses and prions are formidable pathogens in animals and plants Chapter 21: The Evolution of Populations Concept 21.1: Genetic variation makes evolution possible