

Advanced Placement Biology

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Course Outline

Because evolution is the lens through which we view the entire course, it will be referenced throughout the year. The Science Practices will be woven throughout both the investigations and the class activities outside of the investigations.

We will begin each unit with a list of enduring understandings and big ideas to guide you through the main points of the unit and to frame your focused notes. I encourage you to add to these notes during class discussions, listing all of your questions that arise as we discuss each topic.

There are 82 class days before the *AP Biology Exam* and 6 class days after the *AP Biology Exam*.

You can anticipate a quiz over every assigned reading.

You can anticipate an exam on the last day of each unit.

We will utilize *AP Classroom* to the maximum possible extent.

First Days of Advanced Placement Biology

08.13.2020 - 09.10.2020 (10 classes)

| Topics | <i>Campbell Biology 11e</i> | Laboratory Investigations |
|------------------------------|--|-----------------------------|
| Your <i>iNotebook</i> | | |
| Big Ideas in AP Biology | | |
| Science Practices in Biology | | |
| Quantitative Reasoning | | |
| Constructivist Learning | | |
| What is Life? | 1 "Evolution, the Themes of Biology, and Scientific Inquiry" | "Origin of Life" (Carolina) |

Unit 1: "Chemistry of Life"

09.11.2020 - 09.22.2020 (4 classes)

| Topics | <i>Campbell Biology 11e</i> | Laboratory Investigations |
|----------------------------|-----------------------------|---------------------------|
| 1.1 Structure of Water and | 3 "Water and Life" | "Transpiration" |

| Topics | <i>Campbell Biology 11e</i> | Laboratory Investigations |
|---|--|---------------------------|
| 1.2 Elements of Life | 2 "The Chemical Context of Life" | |
| 1.3 Introduction to Biological Macromolecules | 4 "Carbon and the Molecular Diversity of Life" | |
| 1.4 Properties of Biological Macromolecules | | |
| 1.5 Structure and Function of Biological Macromolecules | 5 "The Structure and Function of Large Biological Molecules" | |
| 1.6 Nucleic Acids | | |

Unit 2: "Cell Structure and Function"

09.23.2020 - 10.14.2020 (7 classes)

| Topics | <i>Campbell Biology 11e</i> | Laboratory Investigations |
|--|-------------------------------------|---------------------------|
| 2.1 Cell Structure: Subcellular Components | 6 "A Tour of the Cell" | |
| 2.2 Cell Structure and Function | | |
| 2.3 Cell Size | | |
| 2.4 Plasma Membranes | 7 "Membrane Structure and Function" | |
| 2.5 Membrane Permeability | | |
| 2.6 Membrane Transport | 8 "An Introduction to Metabolism" | "Diffusion and Osmosis" |
| 2.7 Facilitated Diffusion | | |
| 2.8 Tonicity and Osmoregulation | 44 "Osmoregulation and Excretion" | |
| 2.9 Mechanisms of Transport | | |
| 2.10 Cell Compartmentalization | | |
| 2.11 Origins of Cell Compartmentalization | | |

Unit 3: "Cellular Energetics"

10.15.2020 - 11.10.2020 (9 classes)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|----------------------|-----------------------------|---------------------------|
| 3.1 Enzyme Structure | | |
| 3.2 Enzyme Catalysis | | |

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|--|---|---------------------------|
| 3.3 Environmental Impacts on Enzyme Function | | "Enzyme Activity" |
| 3.4 Cellular Energy | | |
| 3.5 Photosynthesis | 10 "Photosynthesis" | "Photosynthesis" |
| 3.6 Cellular Respiration | 9 "Cellular Respiration and Fermentation" | "Cellular Respiration" |
| 3.7 Fitness | | |

Unit 4: "Cell Communication and Cell Cycle"

11.11.2020 - 12.03.2020 (6 days)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|---|-----------------------------|--------------------------------------|
| 4.1 Cell Communication | 11 "Cell Communication" | "Cell Communication" (Carolina) |
| 4.2 Introduction to Signal Transduction | | |
| 4.3 Signal Transduction | | |
| 4.4 Changes in Signal Transduction Pathways | | |
| 4.5 Feedback | | |
| 4.6 Cell Cycle | 12 "The Cell Cycle" | "Cell Division: Mitosis and Meiosis" |
| 4.7 Regulation of Cell Cycle | | |

Unit 5: "Heredity"

12.04.2020 - 12.18.2020 (6 days)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|--|---|---------------------------|
| 5.1 Meiosis | 13 "Meiosis and Sexual Life Cycles" | |
| 5.2 Meiosis and Genetic Diversity | | |
| 5.3 Mendelian Genetics | 14 "Mendel and the Gene Idea" | |
| 5.4 Non-Mendelian Genetics | 16 "The Molecular Basis of Inheritance" | |
| 5.5 Environmental Effects on Phenotype | | |

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|-----------------------------|---|---------------------------|
| 5.6 Chromosomal Inheritance | 15 "The Chromosomal Basis of Inheritance" | |

Unit 6: "Gene Expression and Regulation"

01.07.2021 - 02.05.2021 (11 days)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|---|---|---|
| 6.1 DNA and RNA Structure | 17: "Gene Expression: From Gene to Protein" | |
| 6.2 Replication | | |
| 6.3 Transcription and RNA Processing | | |
| 6.4 Translation | | |
| 6.5 Regulation of Gene Expression | 18 "Regulation of Gene Expression" | |
| 6.6 Gene Expression and Cell Specialization | | |
| 6.7 Mutations | | |
| 6.8 Biotechnology | 20 "DNA Tools and Biotechnology" | "Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST" "Biotechnology: Bacterial Transformation" "Biotechnology: Restriction Enzyme Analysis of DNA" |

Unit 7: "Natural Selection"

02.08.2021 - 03.11.2021 (12 days)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|---------------------------------------|--|---------------------------|
| 7.1 Introduction to Natural Selection | 22 "Descent with Modification: A Darwinian View of Life" | |
| 7.2 Natural Selection | 23 "The Evolution of Populations" | |
| 7.3 Artificial Selection | | "Artificial Selection" |
| 7.4 Population Genetics | | |

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|--------------------------------|-------------------------------------|---|
| 7.5 Hardy-Weinberg Equilibrium | | "Mathematical Modeling: Hardy-Weinberg" |
| 7.6 Evidence of Evolution | 25 "The History of Life on Earth" | |
| 7.7 Common Ancestry | | |
| 7.8 Continuing Evolution | | |
| 7.9 Phylogeny | 26 "Phylogeny and the Tree of Life" | |
| 7.10 Speciation | 24 "The Origin of Species" | |
| 7.11 Extinction | | |
| 7.12 Variations in Populations | | |
| 7.13 Origin of Life on Earth | | "Origin of Life" (Carolina) |

Unit 8: "Ecology"

03.23.2021 - 04.22.2018 (11 days)

| Topics | <i>Campbell Biology 12e</i> | Laboratory Investigations |
|--------------------------------------|--|---------------------------|
| 8.1 Responses to the Environment | 52 "An Introduction to Ecology and the Biosphere" | "Fruit Fly Behavior" |
| 8.2 Energy Flow Through Ecosystems | | "Energy Dynamics" |
| 8.3 Population Ecology | 53 "Population Ecology" | |
| 8.4 Effect of Density on Populations | | |
| 8.5 Community Ecology | 54 "Community Ecology" | |
| 8.6 Biodiversity | | |
| 8.7 Disruptions to Ecosystems | 55 "Ecosystems and Restoration Ecology" 56 "Conservation Biology and Global Change" | |

AP Biology Exam Prep

05.03.2019 - 05.09.2019 (3 days)

In Class Review

On Your Own

1. Assess your readiness.

2. Construct knowledge in your gaps.
3. Quantitative Reasoning
4. The Free Response
5. Experimental Design

AP Biology Exam

Friday, May 14, 2021

After the Exam

05.15.2019 - 05.30.2019 (6 days)

Topics and Skills

1. Reflection
2. Outreach
3. Pursuing Undergraduate Research