

AP Biology Summer Assignments 2020-2021

Congratulations on your course selection of AP Biology!

I would like to premise the summer assignment with the warning that the workload associated with this class is incredibly different than that of freshman Biology. This class will require much of your time, energy, and focus, and the reading is extensive.

I have high expectations, and demand students who are willing to put in the required effort necessary to succeed. **My goal is for every student enrolled in the class to pass the AP Exam in May, and to earn college credit.** This requires dedication, enthusiasm, and hard work on both our parts. I will do my job to the best of my ability, and I expect you to do yours. Because of the short amount of time before the AP Exam and the extensive material we must cover, the work must begin now. *I am looking forward to an outstanding year with you!*

If you have any pressing questions regarding the summer homework, don't hesitate to reach out to me at vchern@upatoday.com - though I will be on "break", I'm actually attending three weeks of training workshops and will be quite busy at certain times. I will do my best to check my emails at least three times a week.
~ Ms. Chern

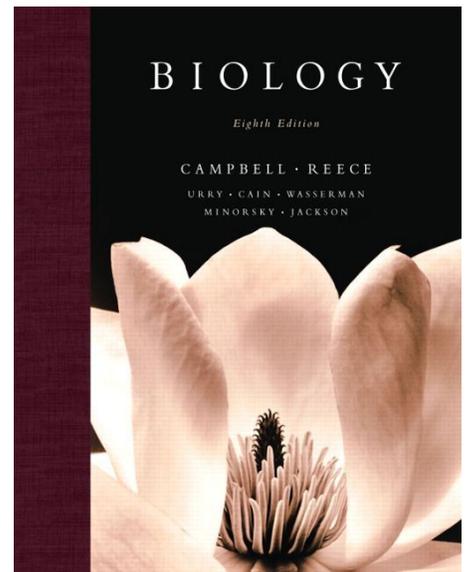
Textbook to be used during the school year →

A recommended study prep book by the same publisher is linked [here](#). (Yes, I know the editions are slightly different, but the material is the same- I have the physical version of the one linked here)

Google Drive [Folder](#) (link) with the entire textbook pdf.

The entire textbook may be too large to open in drive so you will have to download it to access it. You will receive the physical textbook when school begins. Individual chapters are in the folder as well as listed here for ease of access:

- [Chapter 1](#)
- [Chapter 2](#)
- [Chapter 3](#)
- [Chapter 4](#)
- [Chapter 5](#)



**** IMPORTANT, PLEASE READ: The following assignments (#1 and #2) below are due the first day of school in hard copy only, are worth 100 points total and the ONLY assignments going**

into the Summer homework category which may range from 5-9% of your grade. This means that you will not have a chance to save this portion of your grade throughout the semester if you do not complete this by the first day of school. This will have a significant impact on your 1st quarter grade, so be sure not to leave it all to the last minute.

<p>1.) Read Chapters 1-5 and take notes in a college-ruled notebook that will be your AP Biology notebook for the school year (not to be used in another class)</p> <p>50 pts</p>	<ul style="list-style-type: none"> Start each chapter on a new page. For each concept section of the five chapters you will handwrite notes in a notebook under the appropriate section headings (i.e. <u>Concept 1.1 Themes Connect the Concept of Biology</u>). Bullet point or paragraph style are both acceptable, you just need to indicate understanding of major concepts. NOTE: Simply copying the chapter summaries at the end of each chapter or making a vocabulary list is not considered sufficient for credit <p>***For every concept section (1.1, 1.2, 1.3, etc), you MUST write out the entire concept heading, and HIGHLIGHT or UNDERLINE it entirely before starting your notes for that section on the next line.</p>
<p>2.) Complete the Summer Reading Questions (found below or on the link in the description on a separate sheet of binder paper.</p> <p>50 pts</p>	<p>Description/Instructions:</p> <ul style="list-style-type: none"> Answers must be handwritten on a separate sheet(s) of paper. You do not need to rewrite the questions but it must be clear what the question is that you're answering. (for example. Q: <i>What are emergent properties?</i> → your answer should start with: <i>Emergent properties are...</i>) Alternatively, you may print out this document with the questions and write down your answers - this is preferred if you can print.
<p>3.) Be prepared for a multiple choice and short-answer test covering these topics the second week of class</p>	

**** Summer Reading Questions: ** (also [here](#))**

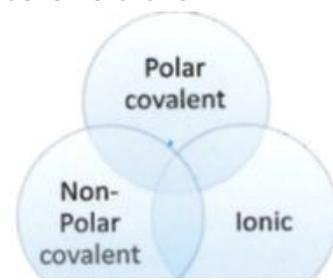
Chapter 1: Themes in the Study of Life

- List the seven properties of life illustrated in figure 1.3, and give a different example of each.
- What are emergent properties? Give two examples.
- Life is organized on many scales. Figure 1.4 zooms you in from viewing Earth from space all the way to the level of molecules. As you study this figure, write in a brief definition of each level (biosphere, ecosystem, community, population, organism, organs/organ systems, tissues, cells, organelles, molecules).

4. Our study of biology will be organized around recurring themes. Make a list of the themes that are presented, and give an example that illustrates each theme. Watch for these themes throughout your study this entire year. This will help you see the big picture and organize your thinking.
5. Describe the two main types of scientific inquiry? Give an example of each.
6. Distinguish between quantitative and qualitative data. Give examples of each.
7. In science, how do we define hypothesis? What are its two important qualities?
8. What is a controlled experiment? Why do we need controls?
9. Explain what is meant by a scientific theory by giving the three ways your text separates a theory from a hypothesis or mere speculation.

Chapter 2: The Chemical Context of Life

1. Distinguish between an element and a compound.
2. Describe the structure of an atom.
3. Identify the four elements that make up 96% of living matter.
4. Define and distinguish among atomic number, mass number, atomic weight, and valence.
5. Given the atomic number and mass number of an atom, how do you determine the number of its neutrons?
6. Draw the electron configuration diagram for sodium. How many valence electrons does it have? Circle the valence electron(s). How many protons does it have?
7. Explain how its electron configuration influences the chemical behavior of an atom.
8. Create a Venn Diagram (3 circles as shown below) to compare and contrast: Polar Covalent Bonds, Non-Polar Covalent Bonds, and Ionic Bonds. Be sure to state examples of molecules/compounds that have these types of bonds.



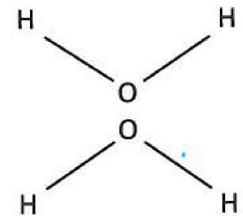
9. Why is water a polar molecule? Draw a molecule showing the poles and explain why this happens.

10. How are Hydrogen (H) bonds and Van der Waals interactions similar? How are they different? Creating a T-chart or Venn Diagram would also be good here.

11. Explain how a molecule's shape influences its biological function.

12. Write the chemical equation that summarizes the process of photosynthesis, noting the reactants and products

Chapter 3: Water and Life



1. Why would you NOT see two water molecules arranged as shown?

2. Why is surface tension associated with cohesion and adhesion?

3. Distinguish between hydrophilic and hydrophobic substances.

4. Explain the basis for the pH scale. What does pH actually measure?

5. Explain how acids and bases directly or indirectly affect the hydrogen ion concentration of a solution.

6. The pH scale is logarithmic, which means each numerical change represents a 10x change in ion concentration.

a. How many more times more acidic is a pH of 3 compared to a pH of 5?

b. Explain the difference between a pH of 8 and a pH of 12 in terms of H⁺ concentration.

7. Even a slight change in pH can be harmful. Explain how buffers moderate pH change.

8. If you got tar (oil) on your foot, why would water NOT be the best way to remove it?

9. Create a chart that has the following information:

Property of Water	Effects of this Property	How can this be seen in nature?
Cohesion		

Adhesion		
High Specific Heat		
Evaporative Cooling		
Expansion upon freezing		
Universal Solvent		

Chapter 4: Carbon and the Molecular Diversity of Life

- Briefly explain Stanley Miller's experiment as well as its significance to Biology
- What is ATP? What is its purpose in cells? How is ATP formed from ADP? (draw a diagram to help illustrate your answer)
- Draw the electron configuration of a carbon atom.
 - How many valence electrons does carbon have?
 - How many bonds can carbon form?
 - What type of bonds does it form with other elements?
- Why is carbon such a useful element in the configuration of a molecule?
- Explain how carbon's electron configuration determines the kinds and numbers of bonds that carbon will form
- Draw Figure 4.10 (yes, all of it). Include the drawings, and summarize the written portions.

Chapter 5: The Structure and Function of Large Biological Molecules

- Create and complete this chart. You will need to use the diagrams to see the functional groups and to get the name of the linkages/bonds that join the monomers together.

Macromolecule	Elements	Monomer	Linkage	Functional Group(s)	Types	Example(s)
Carbohydrates						

Proteins						
Nucleic Acids						

2. Draw Figure 5.5 and summarize the captions. Next, compare/contrast dehydration synthesis (condensation) reactions and hydrolysis

3. Lipids are NOT considered polymers, but ARE considered macromolecules. What is the difference between a polymer and a lipid?

4. What is different about the 20 amino acids that make up proteins?

5. Proteins are found in all levels/aspects of biology. Draw and describe each of the four levels of protein structure

Primary 1°:

Secondary 2°:

Tertiary 3°:

Quaternary 4°:

6. Draw the basic structure of a nucleotide and describe how they link to form a nucleic acid

7. Distinguish between a purine and a pyrimidine

8. Briefly describe the three-dimensional structure of DNA, and explain why the strands must be antiparallel (include 3' and 5' in your explanation)