

Welcome to the Advanced Placement Biology 2020-2021

This course will be jam packed with labs, projects, case studies, problem solving activities and field investigations. You will learn about many, many complex biological processes, apply these concepts to real world scenarios and use your knowledge to solve problems

This course is structured in [8 Main Units and Science Practices](#). All essential knowledge will be taught and all learning objectives will be addressed through this curriculum. The course will focus on inquiry based laboratory work and the use of the seven science practices in both laboratory and non-laboratory activities.

To help you prepare for the course, I am sharing the summer assignment page and a PDF of a reference text for your summer study. The assignment includes readings and short video clips aligned to specific topics to help solidify basic biochemical processes and principles. For each of these topics, there are required note-taking prompts and guiding questions but you should also take notes as you go through each topic.. Again...the assignment is provided to help you build (or reinforce) a basic foundation in biology.

This assignment is not extremely challenging or difficult, however it will require you to put in some time to be sure you own the concepts. Here are a few recommendations:

- Review the entire assignment and generate a work schedule for yourself. Think about how much time you need to read the material and take notes, how much time will you need to watch the videos and how much time will it take you to thoughtfully complete the written work. This will be good practice for managing your time next year.
- I'm sure you could probably complete the assignment over a few days but I advise against it. The cramming will not yield a strong retention of material. You need to marinate with this stuff...draw pictures, think about what's happening at the cellular level, think about how all the pieces fit together.
- It would be best to start this at the end of July so it's fresh in your mind at the beginning of school.
- Draw pictures use color pens and pencils to show processes.

INSTRUCTIONS for Assignment

You will need to purchase the print version of Biology in Focus AP Edition 3rd Edition (you can buy this new, used or the digital version). I think a hard copy of the book is the best but it's heavy and expensive so you make the decision. You'll also need [a lab notebook](#) before school begins in August however for the summer assignment you can use the textbook link provided and any notebook you want.

1. Open the textbook [Campbell Biology 9th](#). This is a big book so it's a big file. Please be patient. It's free :).
2. All work needs to be written out by hand in a separate notebook. ***You may type your work if have a documented computer accommodation. I will collect and review your notebook on the first day of class.
3. Complete each section in the order that it is listed in the assignment below. This is extremely important for building your basic understanding. Clearly label each section with the unit number and name as well as the chapter.
4. You must bring your completed summer assignment to our first class meeting.

AP Biology Summer Assignment 2020

Intro Themes of Life (Includes Chapter 1)

Chapter 1 Work

A. Developing Content Understanding. As you read and watch...please take detailed notes.

- ☐ Read Chapter 1: Introduction to the The Themes of Life (pgs 1-16)
- ☐ Watch [005 - Essential Characteristics of Life](#)
- ☐ Watch [Three Domains of Life](#)
- ☐ Watch [011 - The Origin of Life - Scientific Evidence](#)
- ☐ Watch [Life](#)
- ☐ Watch: [Prokaryotes and Eukaryotes](#)
- ☐ Watch: [History of the Cell Theory](#)

B. Showcase your understanding of chapter 1 by answering the following questions:

1. Copy Figure 1.3 and label the 7 properties of life
2. What are emergent properties?
3. The study of biology is organized into recurring themes. Make a list of the themes presented and give a real world example to illustrate the theme. (Go to the Summary of Key Concepts at the end of chapter for a concise look at the themes)
4. Define the following terms Eukaryotic cell, prokaryotic cell, DNA, genes, genome, negative feedback/positive feedback. Provide a diagram for each definition
5. Explain how life is organized from Domain to Species
6. Explain the differences in the three domains of life. Be sure to identify types of organisms in each domain. Sketch a diagram to show.
7. What are the two main points articulated in Darwin's *The Origin of Species*
8. *List 4 big take aways from this section*

C. Questions you have about material covered in chapter 1:

In this section record questions you have about the content discussed. You can ask clarifying questions or probing questions. Be curious. What would you like to know more about?

Unit 1 Chemistry of Life (Includes Chapters 2, 3, 4 and 5)

Chapter 2 and 3 Work

A. Developing content understanding As you read and watch...please take detailed notes.

- ☐ Read Chapter 2: The Chemical Context of Life (pgs. 30-42)
- ☐ Read Chapter 3: Water is Life (pgs. 46-55)
- ☐ Watch: [Origin of Life \(Chemicals of Life\)](#)
- ☐ Watch: [Chemical Evolution](#)
- ☐ Watch <http://www.bozemanscience.com/ap-chem-001-molecules-elements>
- ☐ Watch [Water: A Polar Molecule](#)
- ☐ Watch: [Properties of Water](#)

B. Showcase your understanding of chapter 2 and 3 by answering the following questions:

1. Describe atomic structure, using the terms proton, neutron, electron, mass number and orbital. Indicate what is meant by electrons in an "excited state" and those in a "ground state"
2. Explain what an isotope is and give two important physical properties of isotopes that make them useful in biological research. Define half-life.
3. Using diagrams, explain what an ion is, and how it forms. Describe an ionic bond.
4. Explain what is meant by pH. Give the name of materials that resist a change in pH.
5. Describe a covalent bond and tell how it differs from an ionic bond. Relate the structure of an atom to its chemical properties and to the type of chemical bond it forms.
6. Explain the important role of weak chemical bonds in the organization of living things.
7. Describe the special physical properties of water. Draw two water molecules in a way that illustrates a hydrogen bond, explain why water is a good solvent and show the basis for the high surface tension of water.
8. How do the unique chemical and physical properties of water make life on earth possible?
9. Indicate why oxygen and carbon dioxide are basic to life, and name the principle source of each of these molecules.
10. What is the difference between a mixture, compound, and a molecule?
11. What is the difference between a polar and nonpolar covalent bond? Give a detailed explanation at the molecular level
12. What properties of water make it an essential component of living material?
13. What is pH? Explain the pH scale, acids, and bases. Why is pH biologically important?
14. Why are buffers important to living things? Explain how a buffer system works.
15. Explain why isotopes are important in biochemical research?
16. List 4 big takeaways from this section

C. Develop fluency with the vocabulary. Make flashcards for the following terms. Be sure you include a label diagram where applicable:

inorganic	ionic bond	cation
atom	valence	hydrogen bond
element	ionization	hydrophobic
proton	molecule	hydrophobic interactions
neutron	molecular formula	hydration
atomic number	structural formula	hydrophilic
mass number(=atomic weight)	compound	bound water
isotope	acid	surface tension
electron	base	capillarity (=capillary action)
valence electrons	hydrogen ion	specific heat
orbital	hydroxide ion	freezing point of water
octet rule	pH	heat of vaporization
half-life	buffer	solvent
radioactive tracer	nonpolar covalent bond	solute
ion	polar covalent bond	aqueous solution
dissociation	ionic bond	
	anion	

D. Questions you have: *In this section record questions you have about the content discussed. You can ask clarifying questions or probing questions. Be curious. What would you like to know more about.*

Chapter 4 and 5 Work

A. Developing Content Understanding **As you read and watch...please take detailed notes.**

- ☐ Read Chapter 4: Carbon and the Molecular Diversity of Life (pg 58-66) and take notes
- ☐ Read Chapter 5: The Structure and Function of Large Biological Molecules (pg 68-80) and take notes
- ☐ Watch [What's so special about carbon](#)
- ☐ Watch [Why is carbon so important for life](#)
- ☐ Watch: [Carbohydrates](#)
- ☐ Watch: [Lipids](#)
- ☐ Watch: [Proteins](#)
- ☐ Watch: [Nucleic Acids](#)
- ☐ Watch: [Human Body, Organic Compounds and Energy](#)

B. Showcase your Understanding by Answering the following question

1. What is the role of carbon in the molecular diversity of life? Why is carbon SO important?
2. Describe the structure of a typical monosaccharide such as glucose. Write out a condensation reaction between two glucose molecules, and explain hydrolysis.
3. Fill in the following table on the functional groups:

Functional Group	Molecular Formula	Names & Characteristics of Organic Compounds Containing Functional Group
	-OH	
		Aldehyde or ketone; polar group
Carboxyl		
	-NH ₂	
		Thiols; cross-links stabilize protein structure
Phosphate		

4. Explain the difference between a saturated and an unsaturated fatty acid. Explain how three fatty acids can react with glycerol to make a fat.
5. Diagram a phospholipid molecule and point out the polar and nonpolar ends. Identify the hydrophobic and hydrophilic ends of this molecule.
6. Identify the alpha-carbon, the carboxyl group, the amino group and the R group of an amino acid.

7. Differentiate between the various levels of protein structure-primary, secondary, tertiary and quaternary.
8. Explain why proteins are so sensitive to changes in temperature and pH.
9. Diagram an individual nucleotide, identify the five-carbon (pentose) sugar, the phosphate group and the nitrogenous base. Indicate with an arrow where the phosphate group of the next nucleotide would attach to build a polynucleotide. Is it a purine or a pyrimidine? Is it a DNA or an RNA nucleotide?
10. Identify examples of each of the four main classes of organic molecules and the building block components of each.

C. Developing fluency with the vocabulary.

Make flashcards for the following terms. Be sure you include a labeled diagram where applicable:

organic chemistry	dehydration	primary structure
carbon	synthesis(=condensation	alpha helix
hydrocarbon	reaction)	secondary structure
isomer	maltose	fibrous proteins
single bond	sucrose	keratins
double bond	lactose	pleated sheet
functional group	hydrolysis	tertiary structure
hydroxyl	polysaccharide	quaternary structure
carbonyl	starch	denatured proteins
aldehyde	glycogen	conjugated proteins
ketone	cellulose	nucleic acids
amino	chitin	DNA
sulfhydryl	fatty acid	parts of a nucleic acid
carboxyl	saturated	purines
phosphate	unsaturated	adenine
macromolecule	phospholipid	guanine
monomer	steroid	pyrimidines
polymer	amino acid	cytosine
monosaccharide	peptide bond	thymine
glucose	polypeptide	uracil
disaccharide	disulfide bond	RNA

D. Questions you have: *In this section record questions you have about the content discussed. You can ask clarifying questions or probing questions. Be curious. What would you like to know more about?*

Unit 2 Cell and Organelles

A. Developing Content Understanding As you read and watch...please take detailed notes.

☐ Read Chapter 6: Cell Organelles and Transport

☐ Watch: [Cell Organelles](#)

☐ Watch: [Compartmentalization](#)

☐ Watch: [Why Cells Are Cells So Small?](#)

☐ Watch: [Cell Membranes](#)

☐ Watch: [Transport Across Membranes](#)

☐ Watch: [Diffusion and Osmosis Lab](#)

B. Showcase your understanding by completing  [Cell Organelle Packet.pdf](#)