



AP Biology Summer Assignment and Survival Guide 2020-2021



Welcome to AP Biology! This course is designed to be the equivalent of a two-semester introductory biology course usually taken in the first year of college. It will be a rewarding experience but will also be very challenging. Throughout the course, you will become familiar with major recurring ideas that persist throughout all topics and material. The main units are:

1. Chemistry of Life
2. Cell Structure and Function
3. Cellular Energetics
4. Cell Communication and Cell Cycle
5. Heredity
6. Gene Expression and Regulation
7. Natural Selection
8. Ecology

To successfully complete the course and meet all the required objectives, you will need to do independent work on your own at home. It will not replace classroom instruction or labs. It is to ensure all material is covered, as we do not have enough time allotted to cover every single topic in AP Biology. During the school year, you will be reading chapters in the book and taking some of your own notes to supplement notes taken in class. In addition to tests, free response questions, labs and unit quizzes, you also will have reading quizzes based off the chapters you must read in the textbook. You will also check out other resources and links we may give to you in class or online, as they will help your understanding of the topic. It is necessary that you do this throughout the year.

On the pages that follow, you will see an AP Bio survival guide. The actual assignment are separate documents and online resources. **The assignment will be due the week of September 14th (exact date TBD).** You only need to turn in the answer pages of the assignment (not the survival guide or this cover page). If you would like to get ahead, you are welcome to work on the assignment over the summer, but you could also work on it once the school year has begun. Either way, you don't need a textbook, but will need to access the Internet.

If you are working on the assignment over the summer and find that any of the links do not work, try and find a similar link, or look up the topic on a search engine such as Google. If you have any questions, feel free to email us at GRobinson@fcps.edu or CCZschoche@fcps.edu. Please give us some time to respond. In the meantime, we hope you'll find some time to relax and get some rest so that you can come back to school refreshed and ready to work! **Have a great summer and stay safe!**

-Mrs. Zschoche and Mr. Robinson

AP Biology Survival Guide

Modified from J. Rosenblum

General Study Habits

Your college professors will expect you to exceed the accomplishments of your high school coursework, and that means you must adjust your study habits to meet this challenge. AP Biology will give you a good idea on what college-level workload is. A good way to begin this adjustment is to consider the ways in which AP science and college coursework differs from high school coursework:

- Material is presented more rapidly and in larger quantities.
- Each exam covers a vast amount of material, labs are an essential part as well..
- Keeping up with previous material is essential to understand the new material, much of the material is intertwined.
- Unlike some other AP classes, considerable out-of-class time investments are required to effectively learn course material.
- Critical thinking is much more important than rote memorization.
- Students are expected not only to understand the specific examples given in class, but also to apply their knowledge broadly.
- No one but you must ensure that necessary coursework gets done on time.
- Help is always available, but you must take the initiative to seek it out, and not at the last possible minute.

Take Studying Seriously

One of the keys to academic success is learning to balance often conflicting pressures. You have to devote the necessary time to study in order to achieve academic success. Generally speaking for every class you have, approximately 1-2 hours of work outside of class is required to master the material. Of course this varies from person to person.

Study Often and Early

The coursework that accompanies this class is demanding. It is therefore essential that you stay ahead of the class by studying often and early. Stay ahead of the lecture schedule, notes are posted on Blackboard for you to review on your own time. Getting ahead of your studies and staying there is one of the biggest favors you can do for yourself.

Don't Be Afraid to Ask for Help

Sometimes it's difficult for students to admit that they are having trouble with a class. Pride, embarrassment, or just the shock of realizing for the first time in your school career that you are unable to quickly master a topic can all contribute to this situation. Experience has shown that AP Biology can be a "problem" course for students. Don't get discouraged!

Unfortunately, many students wait too long before doing something constructive about their difficulties in class. Should you find yourself having problems with AP Biology, you must not be afraid to ask for help as early in the course as possible.

Time Management

In school, as in life in general, there never seems to be enough time. One of the most difficult challenges you will face is to recognize and deal constructively with the fact that you and only you are in charge of determining how your valuable time is spent.

In the past, other may have managed your time for you. Now, the responsibility for scheduling your time and making room for all you have to do rests squarely on your shoulders. One of the most serious mistakes you can make is to commit the error of thinking that you have “plenty of time” to get things done. Since your high school workload is probably getting heavier, and also less of the work in high school will be involving simple memorization as opposed to true understanding of a subject, it is not a viable option to “cram” the night before a test and still expect a good grade.

You really can't get by with only last minute efforts on assignments, and thus you must learn to manage your time wisely.

You must take studying seriously and make a commitment to your work.

This means prioritizing your academic and social activities to ensure that there is adequate time in your schedule to complete all course assignments.

A well-known theory of human learning also holds that people remember information best with then study in frequent, relatively short bouts of time, rather than in last-minute marathon study sessions. One effective way to make time for all your work is to create a weekly activity planner. Get in the habit of making a weekly schedule of your study plans. Then, stick to your plan!

Taking Notes and Reading

College professors expect you to follow a rapidly developing train of thought and to capture those thoughts in your own notes. The notes you take in biology *should...*

- Capture the main points of a lecture, including relevant examples.
- Be organized in some coherent manner for later study.
- Leave room to include additional information learned after lecture.
- Use a personalized shorthand notation that makes sense to you.

Do not record every word said during a lecture or copy, verbatim, words on PowerPoint slides, for example. You must learn to filter out nonessential portions and concentrate on connections between the essential ideas and terms.

Getting the Most out of Your Textbook

To get the most out of your textbook, you need to get in the habit of using it regularly. Moreover, you should consult the book before and after a topic has been covered in class. If you are not reading your textbook, you are missing out on material. There is not enough time in class to cover all aspects of AP Biology.

The best use of a textbook before lecture is to concentrate on the section headings, boldfaced words, figures and figure captions. This will familiarize you with the main points of the topic and facilitate your note-taking efforts.

After lecture, you should go back and carefully reread the assignment. This time you should look for details that reinforce the lecture discussion and supplement your notes with this information. You should also pay special attention to any figures from the textbook that were used during the lecture, possibly recopying some form of those figures into your notes.

Read, Stop, and Ask

This simple rule can really help you in your efforts to assimilate textbook information. The sheer quantity and density of information in biology texts can sometimes be overwhelming, so one way to help transfer what you've read from your short term memory into your long-term memory is to read a section no longer than one page, stop, and then quiz yourself on what you've just read and how it relates to what you already know about the subject.

This method plays on the human brain's ability to learn more easily when material is presented in short segments. It also forces you to make conceptual and factual connections between new and old ideas, which helps to organize complex information in your brain more meaningfully.

-----Do Not Turn Survival Guide In-----

Name: _____ Per _____ DUE: _____

Read through the AP Biology Survival Guide first, and then you may either print out a copy of this assignment to write in your answers. If you're not able to print the assignment, you may write your answers on a separate sheet of paper. You may also submit electronically if Google Classroom is up and running. *If a link is not working, look up the info online.* Please do not cut and paste if you are typing. Plagiarism will result in a zero on the assignment.

Cell Biology and the Cell Cycle

Cell biology is one of the cornerstones of any general biology course. It is important to understand how cells are classified, the structures that make up a typical cell and the processes cells carry on as part of their metabolism. Often, when people think of cells, they imagine a typical round animal cell or rectangular plant cell. But in reality, there is a tremendous amount of diversity among cells in terms of their shapes, structures and functions. By viewing the web sites below, you will be introduced to the variety of cell types, how cells are classified, the organelles that make them function, how they interact with the external environment, the role of the cell cycle and how the cell cycle works.

A. Electron and Light Microscopy

Images captured using electron microscopes have transformed the way we view cells and other biological specimens. Much of what is known about the structure and function of cell organelles is due to electron microscopes. Use the virtual electron and light microscope tutorials on the web pages below to learn more about the technique of electron and light microscopy. You don't need to know the fine details, just the basics on how each work.

SEM - https://myscope.training/#/SEMlevel_3_1

TEM - <https://myscope.training/legacy/tem/background/> (if prompted, select "other", "other" "first time using" and then "ok".

Light Microscopy - https://myscope.training/#/LMlevel_2_1

Image Gallery – Go to Google and search in the images tab for "light microscope images" and "scanning electron microscope images" to observe various microscope images and differences between the two microscopes. You might stumble upon some galleries, check them out!

1. What are some major differences you noticed between scanning electron, transmission electron and light microscopy (be more specific and detailed than "one uses light, the other uses electrons")? Name at least 3 differences between electron and light microscopes.

2. Look through the various images that popped up on Google, which image did you think was the most interesting? Why?

Go to: <https://www.theatlantic.com/photo/2015/10/nikon-small-world-2015/410548/>

3. Look at image 7 of the Antenna of a male moth image. Research on why you think the male's antennae are shaped and formed like they are, and the females are not at all similar looking (do some searching around on the internet for a moth's antennae and why they are shaped the way they are).

B. Cell Biology

Use the link below to look and interact with a Prezi presentation and answer the questions that follow.

http://prezi.com/wkzsj_esclk2/enduring-understanding-1b/

1. What are the 3 main domains that are mentioned who all come from a common ancestor?
2. List the 3 conserved core elements that provide evidence for evolution.
3. List and describe the three structural and functional pieces of evidence used to support the relatedness of all three domains.

Prokaryotic vs Eukaryotic Cells:

4. Watch Mr. Andersen on <https://www.youtube.com/watch?v=1Z9pgST72is> explain the main differences between prokaryotic and eukaryotic cells. List all the differences below. (*note, Bozeman Science with Mr. Andersen is an incredible review video resource!). You don't need to watch the entire 14 minute video.

5. Watch Mr. Andersen again about the endosymbiotic theory. Give a 3-4 sentence summary of what this theory says. Draw or find a picture online of a simple 2-3 step process to show how it works. <https://www.youtube.com/watch?v=-FQmAnmLzE>

6. What pieces of evidence do we have for the endosymbiotic theory?

7. Using any resource, give the proper function of each organelle/structure.

Nuclear Envelope:

Nucleus:

Plasma Membrane:

Rough Endoplasmic Reticulum:

Ribosomes:

Golgi Apparatus:

Peroxisome:

Microtubules/Microfilaments:

Microvilli:

Centrioles:

Mitochondrion:

Lysosome:

Cytosol:

Smooth Endoplasmic Reticulum:

Nucleolus:

Chromatin (what is it?):

Gap Junctions:

Tight Junctions:

Desmosomes:

Plasmodesmata:

Cell fractionation and centrifugation.

8. Using videos in the links below, write a 4-5 sentence brief summary or series of steps on what fractionation and centrifugation are. Why would we want to do these processes?

Centrifugation: <https://www.youtube.com/watch?v=TEGvWNFrvqc>

Fractionation: <https://www.youtube.com/watch?v=xebIHn9JHag>

Use the link below and answer the 2 questions that follow.

http://www.brooklyn.cuny.edu/bc/ahp/LAD/C5/C5_ProbSize.html

9. Why is surface – area – to – volume – ratio important to cells and unicellular organisms?

10. As the ratio becomes (*circle or highlight one*) LARGER SMALLER transfer of materials in and out of the cell become more efficient.

Based on what you just looked at, answer the following 3 items (feel free to look up the information online if you need some extra guidance).

- how do you find the surface area of a cube?

- how do you find the volume of a cube?

-how does finding the SA and V of a cube relate to cell size and surface area?

Use another website or search engine (like Google) to find the answers to the next two questions.

11. What are root hairs and how do they affect surface area?

12. Neatly draw a picture or find a picture of villi in the small intestine and give the function of what villi do.

Use these You Tube links to answer the following 3 questions on apoptosis:

1. <https://www.youtube.com/watch?v=DR80Huxp4y8>
2. <https://www.youtube.com/watch?v=-vmtK-bAC5E>

13. What is apoptosis?

14. The first video looks very complex, give a 3-4 sentence simple summary of what goes on during apoptosis using the 2nd video link. If you need to look at a simpler video, search for one. *There is no need to include all the fancy protein names.*

15. When might apoptosis occur? Give at least 3 examples.

Using the internet or other sources, answer the following 6 questions.

16. Interphase is the first phase of the cell cycle. What are the three main phases of interphase and give a brief explanation what happens in each phase.

17. The cell cycle has checkpoints.

a) What do cyclins do?

b) how do cyclin-dependent kinases control the cell cycle?

18. Research 3 different types of cells in our bodies (nerve/brain, skin, muscle...etc.). Next to each, explain when those types of cells divide, and how often they divide.

19. Mitosis passes a complete genome from the parent cell to daughter cells. Look up the 4 main phases of mitosis and give a brief explanation of each phase.

20. There are regions of plants where cells divide by mitosis continuously. This allows plants to grow, upwards and outwards. We call those meristems. Where are the apical meristems and the lateral meristems located in a plant, and in which direction do they grow? Draw or find a simple picture of a plant and label where they are located.

21. In what ways does binary fission in prokaryotic cells differ from regular mitosis?