Dear prospective AP Biology student,

Welcome to AP Biology!

The AP Biology curriculum focuses on the four "Big Ideas" below:

Big Idea 1	The process of evolution drives the diversity and unity of life.
Big Idea 2	Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.
Big Idea 3	Living systems store, retrieve, transmit and respond to information essential to life processes.
Big Idea 4	Biological systems interact, and these systems and their interactions possess complex properties

You may view the entire College Board AP Biology syllabus at:

- https://apstudent.collegeboard.org/apcourse/ap-biology
- Short url: (https://goo.gl/pnXRNQ)

AP Biology students are expected to design many of their own experiments instead of the traditional "cook-book" type labs. This is more of an inquiry based approach to science. We will work throughout the year developing the skills necessary to design inquiry based experiments. However, you will get started with this during the summer by designing your own plant experiment.

Another change in the course is a focus on statistics and a strong math component. There is now a math section on the AP Biology exam. I encourage you to check out the formula sheet. Anything on this formula sheet is fair game for the exam. See Page 187 of the Course and Exam Description Manual at:

- https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-biology-course-and-exam-description.pdf
- Short URL: https://goo.gl/vXMczH

Our AP Biology course has very high expectations and there is little time to waste. To ensure that you are successful in the class and on the AP Exam next May, we need to start before class begins. I hope that these assignments will be helpful in easing the transition back to school in August.

If you have any questions feel free to email me at kristi.henderson@sfisd.org. I will get back to you as soon as possible. I look forward to an exciting and challenging year in AP Biology.

Sincerely,
Ms. Henderson

Part 1: Introduction

I may be contacting you this summer through email. **So, I am asking you to send me an email by July 22, 2016.** In the email, please do the following:

- Use an email that you will be checking over the summer and throughout next school year.
- In the subject line, put **Your Name-AP Biology** (Ex. Ms. Henderson-AP Biology)
- In the body of the email, answer the following questions, in numerical order. They do not have to be in complete sentences, unless requested.

1. Your name – first and last. Name you preferred to be called.
2. Will you be a Junior or a Senior in the 2014-15 academic year?
3. AP classes you have previously taken.
4. Have you taken Anatomy & Physiology or will you be taking that course this year?
5. List of AP Classes you will be taking during the 2014-2015 academic year.
6. All-time favorite hobby or activity?
7. List your favorite candy or snack.
8. Summarize your family in one sentence.
9. Will you have a job during the school year? If so where?
10. In what clubs and/or extracurricular activities will you participate this coming school year ?
11. Explain in a sentence or two why have you chosen to take AP Biology.
12. Do you have any concerns and/or curiosities about taking AP Biology?
13. What are your plans after graduation?
14. If you had one million dollars that you had to give away, what would you do with it?

Part 2: Preview the AP Biology Curriculum

Visit https://apstudent.collegeboard.org/apcourse/ap-biology or short url https://goo.gl/KzJwA8

You do not need to print all 193 pages (YIKES!). However I would encourage you to take the time to review the curriculum you will be responsible for. In addition, at the end there are some great practice questions. Give them a go and see how you do!

Part 3: Biology Term Scavenger Hunt

For this part of your summer assignment, you will be familiarizing yourself with science terms that we will be using at different points throughout the year.

On the next page is the list of terms.

- **Select and "collect" 40 words/terms**
  - When I say "collect", I mean you should collect that item by finding it and taking a **photograph** (digital or paper printed) or making a **sketch** of that item. You should create a unique way to present your "collection", along with corresponding explanations. You can do this in a number of different ways: PowerPoint, Microsoft Word, and Prezi or by creating an actual photo album. Have another idea for presenting? Just email me!
  - **You do not need to find the exact item on the list, say for example, if it is an internal part to an organism, but you must apply the term to the specimen you find and explain in your finished project how this specimen represents the term**.
    - **EXAMPLE:** If you choose the term "phloem", you could submit a photograph you have taken of a plant leaf or a plant stem and then explain in your project what phloem is and specifically where phloem is in your specimen.

- **ORIGINAL PHOTOS/SKETCHES ONLY:**
  - You cannot use an image from any publication or the Web. You must have taken the photograph (or made the sketch) yourself. The best way to prove that is to place an item (stuffed animal, a button, toy car, etc.) in all of your photographs that only you could have added each time. You could make a small sign of your name that will be in each photo/drawing.

- **NATURAL ITEMS ONLY:**
  - Specimens may be used for only one item/word, and all must be from something that you have found in nature. Take a walk around your yard, neighborhood, and town. DON'T SPEND ANY MONEY! Research what the term means and in what organisms it can be found... and then go out and find one.

- **TEAM WORK:**
  - You may work with other students in the class to complete this project, but **each student must turn in his or her own project** with a unique set of terms chosen.

List of Terms

1. adaptation of an animal
2. adaptation of a plant
3. abscisic acid
4. actin
5. amniotic egg
6. amylase
7. angiosperm
8. animal that has a segmented body
9. annelid
10. anther & filament of stamen
11. arthropod
12. archaebacteria
13. autotroph
14. auxin producing area of a plant
15. basidiomycete
16. Batesian mimicry
17. biological magnification
18. bryophyte
19. C 4 plant
20. Calvin cycle
21. carbohydrate – fibrous
22. cambium
23. cellulose
24. chitin
25. chlorophyta
26. cnidarian
27. coelomate
28. conifer leaf
29. commensalism
30. connective tissue
31. cuticle layer of a plant
32. deciduous leaf
33. deuterostome
34. dicot plant with flower & leaf
35. diploid chromosome number
36. echinoderm
37. ectotherm
38. endosperm
39. endotherm
40. enzyme
41. epithelial tissue
42. ethylene
43. eubacteria
44. eukaryote
45. exoskeleton
46. fermentation
47. flower ovary
48. frond
49. fruit – dry with seed
50. fruit – fleshy with seed
51. gametophyte
52. gastropod
53. genetically modified organism
54. gibberellins
55. glycogen
56. gymnosperm cone
57. haploid chromosome number
58. heartwood
59. hermaphrodite
60. insect
61. K-strategist
62. keratin
63. leaf – gymnosperm
64. lepidoptera
65. lichen
66. lignin
67. lipid used for energy storage
68. littoral zone organism
69. long-day plant
70. meristem
71. modified leaf of a plant
72. modified root of a plant
73. modified stem of a plant
74. monocot plant with flower & leaf
75. muscle fiber – striated
76. mutualism
77. mycelium
78. mycorrhizae
79. myosin
80. nematode
81. niche
82. nymph stage of an insect
83. parasite
84. parenchyma cells
85. phloem
86. pine cone – female
87. platyhelminthes
88. pollen
89. pollinator
90. porifera
91. prokaryote
92. protein – fibrous
93. protein – globular
94. protostome
95. pteridophyte
96. r-strategist
97. radial symmetry
98. rhizome
99. scale from animal with two-chambered heart
100. spore
101. sporophyte
102. stem – herbaceous
103. stem – woody
104. stigma & style of carpel
105. tendril of a plant
106. thorn of a plant
107. unicellular organism
108. vascular plant tissue
109. xerophyte
110. xylem

Biology Prefixes and Suffixes-The Language of Science

The main reason students find it difficult to understand science is because of all the hard to write, spell and read words. Actually, scientific vocabulary is a mix of small words that are linked together to have different meanings. If you learn the meanings of the little words, you'll find scientific vocabulary much easier to understand. Find the mean to the following Greek/Latin root words.

Word	Meaning
a / an	
meso	
leuco	
aero	
anti	
amphi	
aqua / hydro	
arthro	
auto	
bi / di	
bio	
cephal	
chloro	
chromo	
cide	
cyto	
derm	
haplo	
ecto (exo)	
endo	
epi	
gastro	
genesis	
herba	
hetero	
homo	
ov	
kary	
neuro	
soma	
saccharo	
primi / archea	
phyll	
hemo	

Word	Meaning
hyper	
hypo	
intra	
-itis	
lateral	
-logy	
-lysis	
-meter	
mono	
morph	
micro	
macro	
multi / poly	
pod	
-phobia	
-philia	
proto	
photo	
pseudo	
synthesis	
sub	
troph	
therm	
tri	
zoo, zoa	
-tropism	
-taxis	
-stasis	
zyg / zygous	
phago	

Once you have completed the above table, use it to develop a definition, in your own words, for each of the following terms.

1. Hydrology _____
2. Cytolysis _____
3. Protozoa_____
4. Epidermis _____
5. Spermatogenesis _____
6. Exoskeleton _____
7. Abiotic _____
8. Pathogen _____
9. Pseudopod _____
10. Hemophilia _____
11. Endocytosis _____
12. Herbicide _____
13. Anaerobic _____
14. Bilateral _____
15. Autotroph _____
16. Monosaccharide _____
17. Arthropod _____
18. Polymorphic _____
19. Hypothermia _____
20. Biogenesis _____

Part 4: Inquiry Based Plant Experiment

As mentioned above, the new curriculum encourages students to design and conduct their own experiments. You will design an experiment using plants. You will run the experiment and collect data. During the first few weeks of school you will be responsible for creating a mini-poster (more details to come later). You may partner with one other person only. Additional details below.

Inquiry Based Plant Experiment Details:

- Design and conduct an experiment about plants. This may be done alone or with a partner. You may choose to investigate something to do with plant growth, light, fertilizer, root development, pollination etc... Any topic about plants is okay.
- Go online and search for ideas. Don't stress about this, instead have fun while learning! It is okay if everything doesn't turn out "right". This assignment is supposed to get you to think like a scientist, ask questions, and try to find answers.
- I suggest that you use plants that you can commonly find at a local nursery or Home Depot or Lowes.
    - Some suggestions are: beans, tomatoes, peppers, impatients, petunias or marigolds. Try to choose something hardy and easy to grow. You could also use plants growing in your yard, but this may make it more difficult to control the variables.

Lab Notebook:

You are required to keep a Lab Notebook. The notebook should be carbonless duplicate student lab notebook. There are several available at amazon.com that range in price from 10-15 dollars.

_____All entries are dated and organized (all stages of experiment, multiple entries for data)
_____ Background research about plant topic is included; you may print some things or include web links
_____Question / problem is clearly stated
_____Hypothesis is clearly stated
_____ Independent and dependent variables are clearly stated
_____Controls are described
_____ Materials needed are listed
_____Procedures are clearly listed; drawings included as needed
_____Data has been recorded in a student designed chart or table
_____Analysis of data is described
_____ Errors or problems encountered are indicated throughout the lab journal
_____Conclusions are clearly stated

Follow these guidelines for your plant experiment. You will need to document all work by taking pictures of your materials, location, and plants at all stages of the experiment. You will create a mini-poster presentation (based on the guidelines given in class) that documents your experiment and monitoring. We will be presenting these in class beginning **September 6.**

If you are working with a partner, ONE mini-poster presentation will be created during the first week of school but EACH person needs to keep their own lab notebook.

Reminders about **EXPERIMENTAL DESIGN**

An experiment is an organized series of steps used to test a theory or an idea. Experimental design is a specific set of steps that is organized such that the results are as valid as possible. The purpose of experimental design is to eliminate experimental error and to ensure that the results are due to the factor or factors being tested. The experiment, based on a testable hypothesis that was inferred from research, must be repeatable.

Student Objectives for AP Biology Labs:

- Choose which variables to investigate
- Design and conduct experiments
- Design their own experimental procedures
- Collect, analyze, interpret, and display data
- Determine how to present their conclusions

Steps for the Plant Experiment

Step 1: Stating the Purpose/Problem
What do you want to find out? Write a statement that describes what you want to do. It should be as specific as possible. Often, scientists read relevant information pertaining to their experiment beforehand.

> The purpose/problem will most likely be stated as a question such as: **"What are the effects of_____ on_____?"**

Step 2: Defining Variables

INDEPENDENT VARIABLE (IV) (also called the manipulated variable) — the variable that is changed on purpose for the experiment; you may have several levels of your independent variable.

DEPENDENT VARIABLE (DV) (also called the responding variable) — The variable that acts in response to or because of the manipulation of the independent variable.

CONSTANTS (C) — All factors in the experiment that are not allowed to change throughout the entire experiment. Controlling constants is very important to assure that the results are due only to the changes in the independent variable; everything (except the independent variable) must be constant in order to provide accurate results.

CONTROL GROUP - For some experiments, a control (standard of comparison for checking or verifying the results of an experiment) is necessary. All variables must be held constant in the control group.

EXPERIMENTAL GROUP — The group(s) being tested with the independent variable; each experimental group has only one factor different from each other, everything else must remain constant.

REPEATED TRIALS — The number of times that the experiment is repeated. The more times you repeat the experiment, the more valid your results will be.

Step 3: Forming a Hypothesis

A hypothesis is an inferring statement that can be tested. The hypothesis describes how you think the independent variable will respond to the dependent variable. It is based on research and is written prior to the experiment...never change your hypothesis.

For example: The rate of the reaction will increase when the temperature increases.

Never use "I" in your hypothesis (i.e. I believe that...)

It is OK if the hypothesis is not proven by the experiment as long as an explanation is given in the conclusion.

The hypothesis is usually written in an "If…, then..., because..." format.

Step 4: Designing an Experimental Procedure

Select only one thing to change in each experimental group (independent variable).

Change a variable that will help test the hypothesis.

The procedure must tell how the variable will be changed (what are you doing?).

The procedure must explain how the change in the variable will be measured.

The procedure should indicate how many trials would be performed (usually a minimum of 3-4).

It must be written in a way that someone can replicate (copy) your experiment, in step by step format.

Step 5: Results/Data

Qualitative Data is comprised of a **description** of the experimental results (i.e. larger, faster....).

Quantitative Data is comprised of **numbers** results (i.e. 5 cm, 10.4 grams)

The results of the experiment will usually be compiled into a table/chart for easy interpretation.

A graph of the data (results) may be made to more easily observe trends.

Step 6: Conclusion

What have you discovered from this experiment?

What conclusions can be made?

How does the data support your conclusion?

You should indicate any flaws in the research and errors or problems that were encountered.

How could this experiment be improved?

Any ideas for future study?

Part 5: Class Materials

Get yourself ready for class! Below is the list of supplies that you will need.

1. Mead/Five star **HEAVY DUTY** (plastic cover) 5 subject Notebook **College ruled**. (You will need this for 1st semester). Will be used daily in class for notes and daily activities this will called your BILL – Biology Interactive Learning Log
2. ONE 1 ½ -2 inch binder with **clear cover for title page**. Will be kept in class and used to store Review Materials for AP Bio Exam and carbon copies of your labs. This will be your review binder and very important the last semester of school.
3. Laboratory Notebook. Must be a carbonless duplicating notebook. Many brands can be found on amazon.com. **Will be used for all required AP biology labs.**
4. One pack of **expo NEON** markers. Must be NEON. These will be used for mind-mapping on black top tables and will be used extensively during AP Biology Review classes.

Get your BILL ready for Semester ONE of AP Bio!

BILL--The Biology Interactive Learning Log You will also be spending a lot of time with something called BILL. In our AP Biology course, students keep an interactive student notebook (ISN), where you will document your learning and interact with course content. Our ISN is called a **B**iology **I**nteractive **L**earning **L**og, and we will use it daily. On any given day, we could be doing one of the following things in our notebook:

- Solving practice problems
- Interpreting graphs or diagrams
- Creating graphic organizers or concept maps about biology content
- Writing practice free response questions

The activities we will do in our BILL are meant to allow you to interact with the biology content of our class in various ways. The more ways you interact with biological concepts, the more likely you will be able to apply them to new situations, whether it is a test or a lab investigation. To create your BILL, you will need a MEAD/FIVE star HEAVY DUTY (Plastic Cover) spiral 5 subject notebook. **These notebooks are the most durable spiral notebooks – so please make sure you get a high quality one to ensure that your notebook does not fall apart (as will be the case with generic spiral notebooks).**This is important because by the end of the year, you will have a homemade study guide. **This summer**: You will need to decorate the cover of your BILL with a collage of some sort that represents you. I recommend that you cover the front of your notebook with clear packing tape once you have completed the cover to add durability, but also to protect the collage you make. **We will go over how to set up the inside of the BILL in class on the second day of class so be sure you have your notebook with you in class so that you can get it set up**

It is important that you keep up with your BILL on a daily basis, since this learning log is the physical representation of your processing of course concepts. We will use this notebook in class on a daily basis to catalog all the learning that you do both inside and outside the classroom, so it is important that you have it with them each day.

*****BILLs are the Brainchild of Lee Ferguson – Master AP biology teacher**

All components of your summer assignment will be due **Tuesday, September 6, 2017**. If you chose not to work on the assignment over the summer, you will be behind the rest of the class. This assignment will not ruin your summer and it will not be an overload of work.

If you have any questions, please email me. I will be checking my email frequently over summer break.

Thank you for being a dedicated science student!

Ms. Henderson
kristi.henderson@sfisd.org