

Welcome to AP Biology!

In this packet you will find the following:

1. Course introduction
2. Summer assignment Part I: summer book and questions #1-41
3. Summer assignment Part II: grow a plant, make observations, and answer questions #42-47. **PLAN AHEAD:** This will take you 3 weeks!
4. Academic integrity policy that needs to be read and signed by student and parent/guardian.

## Course Introduction

Given the speed with which scientific discoveries and research continuously expand scientific knowledge, educators face the challenge of balancing breadth of content coverage with depth of understanding. The AP® Biology course addresses this challenge by shifting from a traditional “content coverage” model of instruction to one that focuses on enduring, conceptual understandings and the content that supports them.

This approach enables students to spend less time on factual recall and more time on inquiry-based learning of essential concepts, and helps them develop the reasoning skills necessary to engage in the science practices used throughout the study of AP Biology.

Students who take an AP Biology course develop advanced inquiry and reasoning skills, such as designing a plan for collecting data, analyzing data, applying mathematical routines, and connecting concepts in and across domains. The result is a readiness for the study of advanced topics in subsequent college courses — a goal of every AP course.

## The Emphasis on Concepts and Science Practices

The key concepts and related content that define the AP Biology course and exam are organized around a few underlying principles called the big ideas, which encompass the core scientific principles, theories and processes governing living organisms and biological systems.

A practice is a way to coordinate knowledge and skills in order to accomplish a goal or task. The science practices enable students to establish lines of evidence and use them to develop and refine testable explanations and predictions of natural phenomena.

**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.

**Science Practice 1:** The student can use representations and models to communicate scientific phenomena and solve scientific problems.

**Science Practice 2:** The student can use mathematics appropriately.

**Science Practice 3:** The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

**Science Practice 4:** The student can plan and implement data collection strategies appropriate to a particular scientific question.

**Science Practice 5:** The student can perform data analysis and evaluation of evidence.

**Science Practice 6:** The student can work with scientific explanations and theories.

**Science Practice 7:** The student is able to connect and relate knowledge across various scales, concepts and representations in and across domains.

*For more information visit <http://apcentral.collegeboard.com>*

## Course Expectations:

1. Excellent attendance. Since this will be a **MUCH** faster paced course than a normal high school course, missing class will put you at a huge disadvantage. Because of the nature of this course, any time you miss must be made up in an equivalent fashion. You are responsible for any missed material.
2. You will learn to use a college text as a tool for your own learning.
3. You will become proficient in college-level lab procedures and design and execute original experiments.
4. You will write numerous Free Response Questions as preparation for the AP Exam.

## Recommendation

- Purchase an **AP Biology Study Guide** such as *Hotzclaw*, *Barron's*, *Cliff's* or *Kaplan*. Having an exam study guide will allow you to become familiar with the exam format and guidelines to answering questions. In addition, it will provide many practice problems and aid in your preparation for unit exams and the AP exam.

In summary, we are here to help you learn biology and science skills and to help you score as high as possible on the AP Exam. You will have to prepare before you get to class. Remember this is a college class; the pacing will be that of a college class. There will be a lot of problem solving, and the vocabulary can be overwhelming. We have been told the vocabulary in the text we use is equivalent to 4 years of a foreign language. We know you will be busy with many other activities and classes but you will have to make time to work on this class.

We look forward to working with you in the fall and having a great class!



# AP Biology Summer 2017 Assignment

## AP BIOLOGY SUMMER ASSIGNMENT PART I: *Survival of the Sickest*

Read the book Survival of the Sickest by Dr. Sharon Moalem.

Copies of the book are available from the school library in print or digital form. Choose print or digital; not both, so we have enough copies for everyone. You can also purchase your own copy from a bookstore or online.

*Survival of the Sickest: here is what you need to do:*

- I. Before beginning a chapter of the book, review the questions for that chapter. When you are finished reading the chapter, go back and answer the questions for that chapter. Use full sentences and elaborate. We are looking for at least 2-3 thoughtful, detailed sentences per question. Your answers to the questions can be typed or hand-written and scanned.
- II. For this summer assignment and all AP Biology assignments, you must abide by the academic integrity policy (see last page). A signed copy of the integrity policy must be submitted to your teacher.
- III. Most questions can be answered by reading the book, but some questions may require additional research on the web. Include a works cited page at the end for additional resources used to answer questions.
- IV. Review the last section of this packet. You will need to identify an example of each of the 4 Big Ideas from the AP Biology course that you find in the book.
- V. Answers to all questions for the summer assignments are due on TurnItIn on Wednesday 9/6/17. TurnItIn login and class ID information will be given the first week of school.
- VI. We will also have a book chat in class the week of 9/6/17.
- VII. Past AP Biology students have really enjoyed reading this interesting book and we think you will too! There are numerous topics from the book that we will cover during AP Biology. Enjoy!

### Introduction:

1. What is a gene?
2. How is a genetic disorder different from an infectious disease?
3. How does the introduction describe natural selection? (page xiii)
4. Living things are “hard-wired” with what two commands?
5. “DNA isn’t destiny – it’s history.” (page xv) What does that mean?

### Chapter 1:Ironing It Out

6. What is hemochromatosis?
7. What organism causes bubonic plague?
8. What are some of the differences between bacteria and viruses?
9. Why are the macrophages of people with hemochromatosis good at fighting bacteria?
10. What is a genetic mutation?
11. Why are genetic diseases hereditary?

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12. Carrying a copy of the cystic fibrosis gene seems to provide some protection from what infectious disease?

### Chapter 2: A Spoonful of Sugar Helps the Temperature Go Down

13. What is diabetes?
14. What is a hormone?
15. What is an autoimmune disease?
16. “When a disease that is caused at least partially by genetics is significantly more likely to occur in a specific population it’s time to raise the evolutionary eyebrow and start asking questions.” (page 27) Why?
17. Describe the shift in thinking about the time needed for climate change to occur.
18. How do wood frogs manage to survive freezing?
19. “Remember, evolution is amazing – but it isn’t perfect.” (page 46) Why?

### Chapter 3: The Cholesterol Also Rises

20. a. Explain the connection between skin color and sunlight exposure. b. Why does the seemingly contradictory dark-skin of the Inuit Eskimos, living in the dark polar region support this hypothesis?
21. What roles do cholesterol and vitamin D play in the body?
22. Classify cholesterol and vitamin D as either carbohydrates, lipids, proteins or nucleic acids. Explain.
23. Research has demonstrated that it’s not just the presence of a specific genetic variation that can affect our body chemistry...it’s how many times that gene occurs in our genome.” What does this mean? Give 2 examples of this.
24. How are human traits inherited? Explain.

### Chapter 4: Hey, Bud, Can You Do Me a Fava?

25. Describe 3 detailed examples of the evolutionary relationship between plants and their animal predators. Explain whether the relationship is helpful to both the plant and animal involved or not.
26. Choose one of each of these pairs of characteristics to create what you think would be the healthiest person in an area with malaria. Justify all of your choices:
  - a. Male/Female
  - b. African/Mediterranean
  - c. Fava bean eater/non eater

### Chapter 5: Of Microbes and Men

27. Using two examples from this chapter, describe how evolution plays a role in host manipulation and has led to the great diversity of life. (Be sure to reference the key factors that drive evolution.)
28. Define virulence. Pick a disease that exhibits a high level of virulence and a disease or pathogen that exhibits a low level of virulence. Explain how this level of pathogenicity works to benefit that particular disease or parasite.

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## Chapter 6: Jump into the Gene Pool

29. a. To what class of macromolecules does DNA belong and what is DNA composed of?  
b. How much of our DNA contains instructions for building cells?  
c. Where do we believe non coding DNA comes from?
30. a. About how many genes are believed to serve a purpose and how can such a small number of genes code for so much variety? b. What can stress do to our DNA and ultimately, gene expression?

## Chapter 7: Methyl Madness: Road to the Final Phenotype

31. Explain the connection between agouti mice, nutrition, epigenetics, and methylation.
32. How can methylation explain one identical twin gets cancer and the other does not?
33. Describe how we think epigenetics can allow a grandmother to influence her grandchildren's DNA.

## Chapter 8: That's Life: Why You and Your iPod Must Die

34. What is the Hayflick limit?
35. What are telomeres and what is their role?
36. What is the connection between cancer and telomerase?
37. What appears to be the two benefits to aging for a species?

## Big Ideas:

The AP Biology course is designed to emphasize the four Big Ideas listed on the front page of this handout. For each of the four Big Ideas listed, identify an example from the summer reading book that illustrates each AP Biology Big Idea. Justify your choice with 3-5 well-written sentences. Identify the page(s) from the book where you found each example.

38. Big Idea 1: The process of evolution drives the diversity and unity of life. Identify an example from the summer reading that illustrates this Big Idea.
39. Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis. Identify an example from the summer reading that illustrates this Big Idea.
40. Big Idea 3: Living systems store, retrieve, transmit, and respond to information essential to life processes. Identify an example from the summer reading that illustrates this Big Idea.
41. Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties. Identify an example from the summer reading that illustrates this Big Idea.

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### AP BIOLOGY SUMMER ASSIGNMENT PART II: Growing a Plant

- Grow a plant from 3-5 seeds for approximately three weeks. Use the seeds provided or seeds of your choice. For germination and the first week of growth use a set-up similar to that shown in this picture (moist paper towel in a clear bag, leave bag partially open, keep paper towel moist). For weeks 2-3, plant your germinated seeds in a cup with soil. You will practice the skills of observation, data collection, forming conclusions, and analysis.
- Document the growth of your plant by making different types of observations, both qualitative and quantitative. Take a selfie with your plant a minimum of once per week. Type up “field notes” with measurements, descriptions, and new developments.
- Answer the questions listed below.
- If your plant dies, you must start over, but retain all field notes/pictures of your original plant.
- You will need to submit your weekly pictures, field notes and answers to the questions listed below.
- Optional: Bring your plant to school during our first week together. The student whose plant wins a “Best in Show” contest voted on by the class will win a sweet prize.



#### Plant Questions to Answer: #42-47

42. Include your plant observations, field notes, and pictures here.

#### Week One:

43. Why are beans and seeds sold in a container or bag that is devoid of moisture?
44. How does a bean planted beneath moist soil, have the energy to sprout roots and a stem just a few days after germinating? (\*Remember beneath the soil, the bean does not have access to sunlight.) What energetic chemical process is happening in the seed cells to provide the energy for this growth? Explain. (Hint: why do we humans like to eat beans and seeds?)

#### Week Two:

45. Within approximately the first week, the seedling sprouts leaves. What purpose do the leaves serve for the plant? Why is this stage of growth of particular importance? What two energetic chemical processes are now occurring in the plant cells? Explain.
46. What are the sources of nutrients that a plant uses to flower, produce pollen and nectar, and produce its own offspring? In other words, identify how a plant obtains the raw materials it needs for growth and reproduction. (Hint: there is more than one source.)

#### Week Three:

47. If a plant was germinated and grown without sunlight what would you expect to occur concerning the growth and health of the plant in the short term (first 1-2 weeks) vs. the long term (beyond 2 weeks).

## Academic Integrity Policy

Our school values academic integrity. Honest scholarly investigation is the cornerstone of our community's desire to promote the dignity of individual accomplishment.

**Cheating or plagiarism** on academic work will result in no credit for the material. Parents will be notified. An academic incident report will be filed with the student's school counselor and dean.

Academic dishonesty at Fairfield Public Schools is defined as, but not limited to:

- a. Using or possessing unauthorized notes or electronic devices during a test or quiz.
- b. Copying or possessing another student's work during a test or quiz.
- c. Sharing answers during a test or quiz.
- d. Giving information to others who have not taken the test or receiving information from those who have.
- e. Copying another student's class work or homework or allowing your work to be copied.
- f. Plagiarizing another person's work from any resource (periodical, book, the internet, etc.) and submitting it as one's own.
- g. Plagiarizing by paraphrasing or using parts of another person's work (ideas, text, images, etc.) without citing it as a source.
- h. Using an electronic, computer-based, or internet site and/or program translator for the purpose of completing any written or oral class assignment.

## LAB REPORT EXPECTATIONS:

All science courses require laboratory work as a part of the curriculum. This often involves students working together to complete the laboratory activity. A written lab report is turned in to the teacher with information regarding the procedure, data, and an analysis/conclusion based on the data gathered during the lab exercise.

It is the expectation of the Fairfield Public Schools that ALL of the information included in a student's lab report *except* for the procedure and the raw data will be done independently by the student. The purpose of the lab report is for each student to demonstrate his/her own understanding of the concept(s) used in the lab activity and the report should be treated just as any test or quiz would be. Students are not permitted to "work together" on any parts of the lab report beyond the procedure and raw data.

I have read and agree to abide by this academic integrity policy. \_\_\_\_\_ (Date)

\_\_\_\_\_  
(Student printed name)

\_\_\_\_\_  
(Parent/guardian printed name)

\_\_\_\_\_  
(Student signature)

\_\_\_\_\_  
(Parent/guardian signature)