

Adelphi University/Roslyn High School

Biology 111,112

Biological Concepts and Methods

Prerequisite:

Students who take this course must have a 90 average or better in ALL honors level science and math courses. Students that do not meet these criteria are rarely successful in this course. Students should have strong mathematical skills and a very high level of reading comprehension. This course focuses on the deep understanding and application of complex biological principles. While a good memory will be helpful, this course does NOT focus on memorization.

Course Description:

Biological Concepts and Methods is an academically rigorous course that surveys all topics in biology. The major areas of study are broken into 4 big ideas:

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

Text:

Principles of Life, Hillis, Sadava, Heller and Price

Expectations:

This Biological Concepts and Methods course is taught on the level of a first year college biology class. The students will use a regular college textbook and laboratory equipment. A cumulative final exam will be given in May. Students will also have the opportunity to earn 8 college credits from Adelphi University. More information on this will follow. To succeed in this course, students must be willing to work diligently. Homework, lab work and class discussions are all essential activities that students are expected to complete. Students will also be expected to review class notes daily. Class discussions and lectures will also be common. Current news in the area of biology (or science in general) will also be a large part of the course.

Class Website:

Our class website is linked through the High School's website. The address will be distributed shortly to you during class. I operate and maintain this website throughout the year. This website is updated regularly and will contain a class calendar with due dates of upcoming assignments and assessments. Downloads of all class forms, assignments and notes can also be found here. You should bookmark this page and use it frequently.

Evaluations:

Quarterly report card grades will reflect student accomplishment on exams, quizzes, homework and laboratory reports.

Exams: will occur *approximately* every 2 weeks, will consist of multiple choice questions and extended free response/essay questions. Exams for the quarter will be averaged and will be weighted as 45% of your class grade for each quarter. Exam questions will not only evaluate factual knowledge, but also your ability to think, predict, and apply knowledge to new situations.

Quizzes: will usually be announced in advance, but students should be prepared for unannounced quizzes on any of the testing days for science classes. All quizzes during a marking period will be averaged; they will count as 20% of your grade for the quarter.

Lab: The class will include both short term and extended laboratory activities. Some of these will be completed individually and some in pairs or small groups. All lab work will be "written up" and evaluated. Laboratory work will start with teacher guided inquiry and finish with student driven inquiry. You will be expected to use your knowledge of biological concepts to create your own experimental investigations. Extended labs will be submitted as a group. Labs will count as 25% of your class grade.

Homework and Class work: Homework assignments will be given frequently. Each chapter will require the completion of concept review questions, as well as a workbook chapter that will accompany each unit. You are expected to complete **ALL** assignments. Lectures in this course revolve around material covered in the text as well as current information that is brought to class. In general you are expected to have read the chapter material before you come to class. In class we will discuss this material together along with any ancillary reading assignments. You are responsible for all assigned materials. The more input you bring to class the more you will get out of it. Late homework assignments will be accepted on the next day only for ½ credit.

Homework is designed to reinforce your knowledge of the concepts we are studying. In an effort to cut down on the workload of those of you who are excelling on your own, I have implemented the following homework policy:

- Students receiving a 90 or better on the previous exam are exempt from all content review question homework.

Free Response (essays): Since this course uses free response questions to evaluate your knowledge, it is imperative that you learn the proper way to answer them. You will be given

approximately 20 free response questions over the course of the year. They will be graded according to strict guidelines. They will count individually as homework assignments. Collectively the grades will be added up and count as a **major exam for the fourth quarter**.

Final and Midterm Exam: A cumulative midterm exam will be given at the end of the second marking period. This exam will cover all material from the first semester and will count as 20% of your second quarter grade. A Final exam will be given at the end of the year. This exam will count as 20% of your final course grade.

Assignment Responsibilities: You will know well in advance of when assignments are due. Most of your assignments will be submitted digitally using your iPad. It is **YOUR** job to plan accordingly. Printer or computer breakdowns are **NOT** acceptable excuses for missing deadlines. Notes from parents explaining computer, printer or electricity problems will **NOT** be accepted either.

Attendance:

Everyone is expected in class and on time every day. Illegal absences and instances of lateness will be handled according to school district policy. If you are legally absent it is **YOUR** responsibility to find out what you have missed and makeup the work. If you are absent on a quiz or test day you should be prepared to take it the **NEXT** day. This policy will be strictly adhered to unless there are extenuating circumstances.

Academic Integrity: Students are expected to follow all school district guidelines pertaining to academic integrity and plagiarism. FRQ assignments and labs will be submitted using turnitin.com. More information will follow.

Teacher Availability:

Since there is a huge amount of information to learn in this course, we have to move fairly quickly in class in order to cover it all. This will require you to devote much additional time for study. If you still need extra help, do not hesitate to come and see your teacher! I will be available on Monday and Wednesday mornings, as well as Thursday afternoons. I will also be available during office hours, which will be announced during class. Please do not wait until the end of a unit, when an exam is to be given the next day or so. As soon as you feel confused or a bit lost come for extra help.

Supplies:

I Pad
Notebook
Review book
Calculator

Please submit one copy of this sheet to me and keep another copy in the front of your notebook or I Pad.

I have read and I understand these science class policies and procedures.

Pupil's
signature _____ Date _____

Parent/Guardian
signature _____ Date _____

Hillis, Savada, Heller and Price
Nightly Reading Assignments

Read pp. 1 – 14 (Ch 1)

Focus Question: How do biologists accomplish their work?

Pre read Biology Lab: Origin of Life

Read pp. 16 – 23 (Ch2)

Focus Question: How do bonds contribute to chemical properties?

Read pp. 24 – 33 (Ch2)

Focus Question: How are carbohydrates and lipids?

Read pp. 36 – 45 (Ch 3)

Focus Question: How are nucleic acids, proteins organized?

Read pp. 46 – 55 (Ch 2)

Focus Question: How do enzymes do their jobs?

Pre read Biology Lab: Enzyme Catalysis

Exam on next testing day Ch 1 - 3

Read pp. 57 – 64 (Ch 4)

Focus Question: How are cells organized?

Read pp. 65 – 67 (Ch 4)

Focus Question: What are the functions of the endomembrane system?

Read pp. 68 – 77 (Ch 4)

Focus Question: What are the functions of nonendomembrane system organelles?

Read pp. 78 – 82 (Ch 5)

Focus Question: How is the cell membrane organized?

Read pp. 83 – 86 (Ch 5)

Focus Question: What are the mechanics of passive transport?

Read pp. 87 – 90 (Ch 5)

Focus Question: What are the mechanics of active transport?

Pre read Biology Lab: Diffusion and Osmosis

Read pp. 91 – 99 (Ch 5)

Focus Question: How do cells communicate with each other?

Pre read Biology Lab: Cell Signalling

Exam on next testing day Ch 4 & 5

Read pp. 100 – 106 (Ch 6)

Focus Question: How is energy transferred in biochemical reactions

Read pp. 107 – 109 (Ch 6)

Focus Question: How do respiration reactions release energy from carbohydrates?

Read pp. 110 – 112 (Ch 6)

Focus Question: How are catabolic and anabolic reactions coupled?

Pre read Biology Lab: Cell Respiration

Read pp. 159 – 163 (Ch 6)

Focus Question: How do cells harvest chemical energy?

Read pp. 113 – 115 (Ch 6)

Focus Question: Why is chlorophyll the most important molecule on earth?

Read pp. 116 – 117 (Ch 6)

Focus Question: How do photosystems “make” ATP?

Read pp. 118 – 121 (Ch 6)

Focus Question: How do plants build food from ATP, CO₂ and H₂O?

Pre read Biology Lab: Plant pigments and photosynthesis

Exam next testing day Ch 6

Read pp. 124 – 128 (Ch 7)

Focus Question: How do cells divide?

Read pp. 129 – 134 (Ch 7)

Focus Question: How is mitosis regulated by cells?

Read pp. 134 – 143 (Ch 7)

Focus Question: How are gametes formed?

Exam next testing day – Ch 7

Read pp. 144 – 150 (Ch 8)

Focus Question: How did Mendel explain inheritance?

Read pp. 151 – 155 (Ch 8)

Focus Question: Does all inheritance fit Mendelian rules?

Read pp. 156 – 160 (Ch 8)

Focus Question: How does linkage affect inheritance?

Read pp. 160 – 164 (Ch 8)

Focus Question: How do prokaryotes exchange genes?

Pre read Biology Lab #7: The Genetics of Organisms

Exam next testing day Ch 8

Read pp. 165 – 171 (Ch 9)

Focus Question: How did scientists determine DNA structure?

Read pp. 172 – 178 (Ch 9)

Focus Question: How does DNA duplicate?

Read pp. 179 – 185 (Ch 9)

Focus Question: How are mutations passed on through DNA?

Read pp. 186 – 190 (Ch 10)

Focus Question: How does genetic information flow through the cell?

Read pp. 190 – 195 (Ch 10)

Focus Question: How is transcription accomplished?

Read pp. 196 – 207 (Ch 10)

Focus Question: How is translation and protein modification accomplished?

Read pp. 208 – 212 (Ch 11)

Focus Question: How is gene activity regulated?

Read pp. 213 – 215 (Ch 11)

Focus Question: How do operons control prokaryotic transcription?

Read pp. 216 – 225 (Ch 11)

Focus Question: How do eukaryotes control transcription?

Pre read Biology Labs: Molecular Biology (Restriction Analysis and Bacterial Transformation)

Review Molecular Biology Lab Stuff From Dolan DNA Learning Center!!!

Exam next testing day Ch 9 – 11

Read pp. 226 – 238 (Ch 12)

Focus Question: How are genomes sequenced?

Read pp. 239 – 243 (Ch 12)

Focus Question: How does understanding a genome benefit life?

Read pp. 244 – 254 (Ch 13)

Focus Question: How does gene technology create new gene combinations?

Read pp. 255 – 262 (Ch 13)

Focus Question: What are the risks and rewards of biotechnology?

Read pp. 263 – 285 (Ch 14)

Focus Question: How do genes regulate development?

Exam next testing day Ch 12 – 14

Read pp. 288 – 292 (Ch 15)

Focus Question: How did Darwin form his ideas about natural selection?

Read pp. 294 – 313 (Ch 15)

Focus Question: How do populations evolve?

Pre read Biology Lab #8: Population Genetics

Read pp. 314 – 331 (Ch 16)

Focus Question: How do phylogenies give us an evolutionary history?

Read pp. 332 – 346 (Ch 17)

Focus Question: How does speciation happen?

Read pp. 347 – 364 (Ch 18)

Focus Question: What evidence is there that evolution has taken place?

Read pp. 366 – 382 (Ch 19)

Focus Question: How are the Prokaryotes organized?

Read pp. 382 – 387 (Ch 19)

Focus Question: What is a virus?

Exam next testing day Ch 15 – 19

Midterm Exam

Read pp. 506 – 520 (Ch 24)

Focus Question: How are plant tissues organized?

Read pp. 522 – 538 (Ch 25)

Focus Question: How do plants transport materials?

Read pp. 539 – 555 (Ch 26)

Focus Question: How do plants respond to their environment?

Read pp. 556 – 571 (Ch 27)

Focus Question: How do flowering plants reproduce?

Read pp. 572 – 586 (Ch 37)

Focus Question: How do plants “defend “ themselves?

Exam next testing day Plant Unit Exam

Pre read Biology Lab: Transpiration

Read pp. 588 – 602 (Ch 29)

Focus Question: How do organisms maintain homeostasis?

Read pp. 603 – 609 (Ch 30)

Focus Question: How do hormones signal cells?

Read pp. 610 – 619 (Ch 30)

Focus Question: How do endocrine glands signal cells?

Read pp. 672 – 680 (Ch 34)

Focus Question: How do neurons conduct a message?

Read pp. 681 – 684 (Ch 34)

Focus Question: How do messages move from one neuron to the next?

Read pp. 685 – 694 (Ch 34)

Focus Question: How are nervous systems organized?

Exam next testing day on Ch 29, 30 & 34

Read pp. 746 – 750 (Ch 38)

Focus Question: What are the components of a circulatory system?

Read pp. 751 – 764 (Ch 38)

Focus Question: How are materials moved through the circulatory system?

Pre Read Biology Lab: Physiology of the circulatory system

Read pp. 620 – 626 (Ch 31)

Focus Question: How does the immune system protect the body?

Read pp. 627 – 637 (Ch 31)

Focus Question: How does the immune system recognize pathogens?

Exam next testing day Ch 31 & 34

Read pp. 799 – 819 (Ch 41)

Focus Question: How do behaviors benefit organisms?

Pre Read Biology Lab: Animal Behavior

Read pp. 822 – 841 (Ch 42)

Focus Question: How do climates affect the distribution of life on earth?

Read pp. 842 – 858 (Ch 43)

Focus Question: How is population growth controlled by the environment?

Read pp. 859 – 872 (Ch 44)

Focus Question: How do organisms interact with one another?

Read pp. 873 – 891 (Ch 45)

Focus Question: How does energy flow in an ecosystem?

Read pp. 892 – 909 (Ch 46)

Focus Question: How does the global ecosystem function?

Pre read Biology Lab #12: Dissolved Oxygen and Aquatic Primary Productivity

Behavior and Ecology Unit Exam (Ch41 – 46) on next testing day.

Final Exam

Listing of Labs for Biological Concepts and Methods (Adelphi High School Program)

Each of the following Laboratory activities requires approximately 7 periods of class time. The class time is portioned as follows:

- **2 class periods** to perform the guided activity from the instructions
- **1 class period** to discuss the data among the group members and design their inquiry activity
- **2 class periods** to perform the inquiry activity
- **1 class period** to discuss the data among the group members and begin assembling their formal lab report
- **1 class period** for the groups to present and explain their data and conclusions from the inquiry portion of the activity to the class and answer any questions about their inquiry portion

Each class period in Roslyn High School is 40 minutes in length. The total time spent on laboratory activities is 4,760 minutes per school year, which is approximately 79 hours of contact time for laboratory activities.

We spend 25% of our course time performing laboratory activities.

Our single/double schedule puts us at 15 class periods (40 minutes each period) every 2 weeks for a total of 300 minutes each week and 600 every 2 weeks. This puts us at 75 minutes for lab each week (150 every 2 weeks) and 225 for lab each week (450 minutes every 2 weeks).

Our total contact time is 12,000 minutes for the year, 9,000 of that for instruction and 3,000 for lab.

1. Enzyme Activity
2. The Rate of Paperase
3. Origin of Life
4. Osmosis and Diffusion
5. Cell Communication
6. Cellular Respiration
7. Plant Pigments and Photosynthesis
8. Genetics of Organisms
9. Exploring Mendelian Genetics (Fast Plants)
10. Population Genetics and Evolution
11. Restriction Analysis
12. Bacterial Transformation
13. Understanding Evolutionary Relationships
14. Physiology of Circulatory System
15. Transpiration
16. Animal Behavior
17. Species Interactions