

Biology for the Rhetoric Stage

Biology for the Rhetoric Stage

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Sample

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Introduction to the Parents

In *Success in Science: A Manual for Excellence in Science Education*, we state that the high school student is “a law student. They have access to a great deal of organized, filed away information, but they are still learning the advanced techniques, as well a learning when to use the material and how to apply it.”¹ The goals of science instruction at the rhetoric level are to make sure that the students know and understand the key principles and laws at work in science, and to teach them how to relate what they have learned to what they see around them. *Biology for the Rhetoric Stage* integrates the above goals into high school science instruction, as suggested in our book.

Textbook

For this study, we have chosen to use a widely available, standard text book, *CK-12 Biology*. You can download this text or read it online here:

 <http://www.ck12.org/book/CK-12-Biology/>

The students will complete their reading assignment and then answer several of the questions from the text. Their answers should be added to the reading section of their science notebooks. They will also define several of the key terms from the chapter, which should be added to the glossary section of their notebook.

Experiment

Almost all of the experiments come from Late Nite Labs, an excellent program for online labs. Access can be purchased through our website:

 <http://elementalscience.com>

At the end of each unit, the student will complete a full lab report for one of the experiments. An article explaining what a full lab report is can be found in the Appendix on pg. 113.

There are several weeks where there is no Late Nite Lab; instead, we have scheduled a hands-on experiment for the students to complete. Here is a list of the supplies you will need for these weeks:

- ✓ Unit 2 Week 3 - A piece of banana or strawberry, Dish soap, Salt, Ice-cold Isopropyl alcohol (70% or higher), Zipper-style plastic bag, Coffee filter, Funnel, Wooden coffee stirrer, Clear glass
- ✓ Unit 3 Week 3 - Posterboard

We have also included optional hands-on experiments for each week. You can see a list of the supplies you will need for these in the Appendix on pg. 121.

¹Bradley R. Hudson and Paige Hudson, *Success in Science: A Manual for Excellence in Science Education* (Elemental Science, 2012), 86

Events in Science

This guide gives two options for the Events in Science section. One will familiarize the students with current events in science as they research on the internet for the various topics. The other will familiarize the students with the key historical figures in biology. We recommend that you choose one or the other to assign your students, as completing both options will be quite a lot of additional work.

Possible Schedules

You should expect the students to take approximately 5 to 6 hours each week to complete the given work. We have included two possible schedules for your reference: a two-days-a-week and a five-days-a-week schedule. Please feel free to alter this to suit each student's needs.

The Science Notebook

This year, the students will each create their own science notebooks. Each notebook should contain the following sections:

-  Reading - This section of the notebook will contain any notes the students have taken, along with the answers to the questions the students are assigned each week.
-  Lab - This section of the notebook will house the student's notes from the experiments they have done, along with any other materials relating to the labs.
-  Events - This section of the notebook will include either the current events article summaries or the historical reports the student has done.
-  Glossary - This section of the notebooking will have the definitions for the assigned vocabulary words.

The student can use a composition book and divide it into the required sections or use a three-ring binder with dividers for the science notebook.

Grading and Credits

This course meets the requirements for a full credit of high school biology or a full credit of lab science, depending upon which your student needs. Each week, the student will answer questions and define vocabulary that can count towards a class work grade for the course. For each lab, the student will complete a multiple choice section, which you can use for the lab grade for the course. At the end of each unit, we have included a unit exam, which you can use for the exam grade for the course. We suggest you use the following percentages to come up with a final grade for the course:

-  Class work: 35 %
-  Lab Grade: 35 %
-  Exams: 30 %

Note - The multiple choice sections from the lab are graded automatically through Lab Nite Labs. The answers for the exams can be found on pg. 125 of the Appendix in this guide and a grading rubric for the Scientist Biography Reports can be found on pg. 127 of the Appendix.

Science-Oriented Students

If you have a student who plans to go on to major in the sciences, we suggest that you add an in-depth project and a research report to this program. An explanation of the in-depth project can be found on pg. 116 of the Appendix in this guide. An explanation of the research report can be found on pg. 117 of the Appendix in this guide.

Final Thoughts

If you find that this program contains too much work, please tailor it to the needs of your students. As the authors and publishers of this curriculum, we encourage you to contact us with any questions or problems that you might have concerning *Biology for the Rhetoric Stage* at support@elementalscience.com. We will be more than happy to answer you as soon as we are able. We trust that you and your students will enjoy *Biology for the Rhetoric Stage*!

Introduction to the Students

Welcome to Biology! This year you will learn about biochemistry, cell structure, photosynthesis, genetics, plants, microorganisms, anatomy, and much more. In this guide, you will find assignment sheets for each week. Each sheet is divided into four sections - textbook, experiments, events in science, and possible schedules. Let's look closer at each one:

- 📖 Textbook - For this study, we have chosen to use a widely available, standard text book, *CK-12 Biology*. You will complete your reading assignment and then answer several of the questions from the text. You will also define several of the key terms from the chapter.
- 🖥️ Experiment - The experiments in the program are almost all virtual. These come from Late Nite Labs, an excellent program for online experiments. Within this virtual lab, you will find background information for each lab, the procedure, and space for you to take notes.
- 🕒 Events in Science - There are two options for the Events in Science section. One will familiarize you with current events in science as you research on the internet for the various topics. The other will familiarize you with the key historical figures in biology. Please check with your teacher to see which option you would be expected to complete.
- 📅 Possible Schedules - You should count on taking approximately 5 to 6 hours each week to complete the given work in this course. We have included two possible schedules for your reference: a two-days-a-week and a five-days-a-week schedule. Please feel free to alter this to suit your needs.

The Science Notebook

This year, you will create a science notebook containing your work from the course. The notebook should contain the following sections:

- 📖 Reading - This section of the notebook will contain any notes you have taken, along with the answers to the questions you have been assigned each week.
- 📖 Lab - This section of the notebook will house your notes from the experiments you have done, along with any other materials relating to the labs.
- 📖 Events - This section of the notebook will include either the current events article summaries or the historical reports you have done.
- 📖 Glossary - This section of the notebooking will have the definitions for the assigned vocabulary words.

You can use a composition book and divide it into the required sections or use a three-ring binder with dividers for your science notebook.

Final Thoughts

We hope that you will enjoy your journey through biology with *Biology for the Rhetoric Stage*. If you have any questions or problems as you complete the work in this program, please email us at support@elementalscience.com. We will be more than happy to answer them as soon as we are able.

Biology for the Rhetoric Stage

Unit 1 - Cell Structure,
Function, and Reproduction

Unit 1: Cell Structure, Function, and Reproduction

Overview of Study

Week 1 Assignment Sheet - Introduction to Biology	12
Week 2 Assignment Sheet - Chemistry of Life, part 1	14
Week 3 Assignment Sheet - Chemistry of Life, part 2	16
Week 4 Assignment Sheet - Cell Structure and Function, part 1	18
Week 5 Assignment Sheet - Cell Structure and Function, part 2	20
Week 6 Assignment Sheet - Photosynthesis and Cellular Respiration, part 1	22
Week 7 Assignment Sheet - Photosynthesis and Cellular Respiration, part 2	24
Week 8 Assignment Sheet - Cell Cycles	26
Week 9 Assignment Sheet - Mitosis	28
Week 10 Assignment Sheet - Meiosis	30
Unit 1 Test	32

Notes

Week 1 Assignment Sheet - Introduction to Biology

Textbook Assignments

Reading

 *CK-12 Biology* Sections 1.1, 1.2, 1.3

Written

After you finish reading, answer questions #1-6 in section 1.3 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:

- | | |
|-----------------------------------------------|-----------------------------------|
| <input type="checkbox"/> Dependent variable | <input type="checkbox"/> Stage |
| <input type="checkbox"/> Independent variable | <input type="checkbox"/> Turret |
| <input type="checkbox"/> Scientific theory | <input type="checkbox"/> Aperture |
| <input type="checkbox"/> Scientific law | <input type="checkbox"/> Rheostat |

Experiment - Introduction to the Virtual Biology Lab

Purpose

The purpose of this lab is to familiarize you with how a virtual lab works and to get you comfortable with using Late Nite Labs.

Pre-Reading

 Read the background and procedure sections for the “Introduction to Virtual Biology Labs” lab in Late Nite Labs.

Procedure

- ✓ Do the lab entitled “Introduction to Virtual Biology Labs” in Late Nite Labs.

Lab Notebook

 Write down on a sheet of paper or type out your notes in Late Nite Labs as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook.

Lab Exam

- ✎ Complete the multiple choice section of the “Introduction to Virtual Biology Labs” lab in Late Nite Labs. Submit the grade to your teacher.

Optional Hands-on

✂ Practice using a microscope by making wet mount and dry mount slides. Directions can be found here: <http://elementalblogging.com/using-microscope-for-homeschool-science/>.

Events in Science

Current Events

- ⌚ Find a current events article relating to the field of biochemistry and complete the article summary sheet found on pg. 131 of the Appendix. Once you are done, add the sheet to

the events section of your science notebook.

Historical Figures

- ⌚ Begin to research the life and work of Aristotle, who is considered by many to be the father of biology. You will have three weeks to complete your research. After that, you will have two weeks to prepare a two to three page paper on this scientist and his contributions to the field of biology.

Possible Schedules

Two Days a Week

Day 1	Day 2
<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Sections 1.1 and 1.2. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. <input type="checkbox"/> Read the background and procedure sections for the week's lab. <input type="checkbox"/> Do the current events assignment and add the sheet to the events section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.3. <input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook. <input type="checkbox"/> Do the "Intro to Virtual Biology Labs" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook and complete your lab exam for the week.

Five Days a Week

Day 1	Day 2	Day 3	Day 4	Day 5
<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Sections 1.1 and 1.2. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 1.3. <input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read the background and procedure sections for the week's lab. 	<ul style="list-style-type: none"> <input type="checkbox"/> Do the "Intro to Virtual Biology Labs" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Complete your lab exam for the week. <input type="checkbox"/> Do the optional Hands-on Assignment.
<h4>Throughout the Week</h4> <ul style="list-style-type: none"> <input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook. 				

Week 2 Assignment Sheet - Chemistry of Life, part 1

Textbook Assignments

Reading

 *CK-12 Biology* Sections 2.1, 2.2

Written

After you finish reading, answer questions #1-7 in section 2.1 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:

- | | |
|--------------------------------------------------|---------------------------------------------|
| <input type="checkbox"/> Amino Acid | <input type="checkbox"/> Monosaccharide |
| <input type="checkbox"/> Carbohydrate | <input type="checkbox"/> Polysaccharide |
| <input type="checkbox"/> Complementary Base Pair | <input type="checkbox"/> RNA |
| <input type="checkbox"/> DNA | <input type="checkbox"/> Anabolic Reaction |
| <input type="checkbox"/> Lipid | <input type="checkbox"/> Catabolic Reaction |

Experiment - Scientific Method

Purpose

The purpose of this lab is to familiarize you with how to use scientific methods to investigate a phenomenon.

Pre-Reading

 Read the background and procedure sections for the “Scientific Method” lab in Late Nite Labs.

Procedure

- ✓ Do the lab entitled “Scientific Method” in Late Nite Labs.

Lab Notebook

 Write down on a sheet of paper or type out your notes in Late Nite Labs as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook.

Lab Exam

- ✎ Complete the multiple choice section of the “Scientific Method” lab in Late Nite Labs. Submit the grade to your teacher.

Optional Hands-on

✂ Learn about how complimentary base pairs work by creating a DNA ladder out of Legos. Directions can be found here: <http://elementalblogging.com/homeschool-science-corner-dna/>.

Events in Science

Current Events

- 🕒 Find a current events article relating to the field of biochemistry and complete the article

summary sheet found on pg. 131 of the Appendix. Once you are done, add the sheet to the events section of your science notebook.

Historical Figures

- ⌚ Continue to research the life and work of Aristotle.

Possible Schedules

Two Days a Week

Day 1	Day 2
<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.1. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. <input type="checkbox"/> Read the background and procedure sections for the week's lab. <input type="checkbox"/> Do the current events assignment and add the sheet to the events section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.2. <input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook. <input type="checkbox"/> Do the "Scientific Method" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook and complete your lab exam for the week.

Five Days a Week

Day 1	Day 2	Day 3	Day 4	Day 5
<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.1. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.2. <input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Read the background and procedure sections for the week's lab. 	<ul style="list-style-type: none"> <input type="checkbox"/> Do the "Scientific Method" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook. 	<ul style="list-style-type: none"> <input type="checkbox"/> Complete your lab exam for the week. <input type="checkbox"/> Do the optional Hands-on Assignment.

Throughout the Week

- Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.

Week 3 Assignment Sheet - Chemistry of Life, part 2

Textbook Assignments

Reading

 *CK-12 Biology* Section 2.3

Written

After you finish reading, answer questions #1-6 in section 2.3 and file your work in the reading section of your science notebook. Then, define the following terms in the glossary section of your science notebook:

Acid

Base

pH

Polarity

Experiment - Acids, Bases, and pH Buffers

Purpose

The purpose of this lab is to understand the relationships between acids and bases, as well as to become familiar with measuring pH.

Pre-Reading

 Read the background and procedure sections for the “Acids, Bases, and pH Buffers” lab in Late Nite Labs.

Procedure

✓ Do the lab entitled “Acids, Bases, and pH Buffers” in Late Nite Labs.

Lab Notebook

 Write down on a sheet of paper or type out your notes in Late Nite Labs as you do the experiment. After you are done, print out your lab notes and add them to the lab section of your science notebook.

Lab Exam

✎ Complete the multiple choice section of the “Acids, Bases, and pH Buffers” lab in Late Nite Labs. Submit the grade to your teacher.

Optional Hands-on

✂ Test common household materials to see if they are acids or bases. Directions can be found here: <http://elementalblogging.com/science-corner-kitchen-acid-test/>.

Events in Science

Current Events

⊕ Find a current events article relating to the field of biochemistry and complete the article summary sheet found on pg. 131 of the Appendix. Once you are done, add the sheet to the events section of your science notebook.

Historical Figures

⊕ Continue to research the life and work of Aristotle.

Possible Schedules

Two Days a Week

Day 1	Day 2
<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.3. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook. <input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook. <input type="checkbox"/> Do the current events assignment and add the sheet to the events section of your science notebook.	<input type="checkbox"/> Read the background and procedure sections for the week's lab. <input type="checkbox"/> Do the "Acids, Bases, and pH Buffers" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook and complete your lab exam for the week.

Five Days a Week

Day 1	Day 2	Day 3	Day 4	Day 5
<input type="checkbox"/> Read <i>CK-12 Biology</i> Section 2.3. <input type="checkbox"/> Add the vocabulary to the glossary section of your science notebook.	<input type="checkbox"/> Answer the assigned questions in the reading section of your science notebook.	<input type="checkbox"/> Read the background and procedure sections for the week's lab.	<input type="checkbox"/> Do the "Acids, Bases, and pH Buffers" lab in Late Nite Labs. <input type="checkbox"/> Record what you have done in the lab section of your science notebook.	<input type="checkbox"/> Complete your lab exam for the week. <input type="checkbox"/> Do the optional Hands-on Assignment.
Throughout the Week				
<input type="checkbox"/> Choose one of the Events in Science assignments to do and add your work to the events section of your science notebook.				

Optional Hands-on Experiments Supply List

Unit 1: Cell Structure, Function, and Reproduction

Week	Supplies Needed
1	Microscope, Blank slides, Various materials to examine
2	Lego bricks
3	Red cabbage juice or pH paper, Common household chemicals such as bleach, ammonia, and vinegar
4	Jell-O, Margarine container, Grape, Other materials for organelles
5	Gummy bears, Glass, Water
6	Leaf, Bowl, Water
7	Bowl, Water, Sugar, Yeast
8	Chicken egg
9	Pipe cleaners, Poster board
10	Pipe cleaners, Poster board

Unit 2: Genetics and Evolution

Week	Supplies Needed
1	Legos
2	Easter eggs, M&M's
3	Types of food, such as a banana or a slice of bread
4	Family pictures, Poster board
5	<i>No supplies needed.</i>
6	Sheet of paper, Pencil
7	<i>No supplies needed.</i>

Unit 3: Ecology, Eukaryotes, and Plant Life

Week	Supplies Needed
1	Sheet of paper, Pencil
2	<i>No supplies needed.</i>
3	<i>No supplies needed.</i>
4	Swabs, Petri dishes, Agar
5	Gloves, Trowel, Magnifying glass or hand-held microscope
6	Magnifying glass or hand-held microscope, Putty knife
7	Flower, Razor, Magnifying glass, Q-tip, Blank slide, Microscope

8	Onion, Glass, Water, Blank slide, Stain, Microscope
9	Large clear jar, Aquarium pebbles or other small rocks, Activated charcoal, Potting soil, Moss

Unit 4: Animals and the Human Body

Week	Supplies Needed
1	Starfish dissection kit
2	Worm farm kit or Glass jar, Potting soil, Crushed leaves, Worms
3	Perch dissection kit
4	<i>No supplies needed.</i>
5	Pool noodle, Washers, Hair ties, Nylon rope
6	Pom-poms, Pipe cleaners, Straw
7	Heart dissection kit
8	Glitter, A few friends
9	<i>No supplies needed.</i>