Science

Nature Notebook
Nature Walks & Scouting
Biology Lessons
Biology Labs

Alveary

About the Course

This course includes the following topic(s): Biology Lessons, Biology Labs, Nature Notebook: Grades 9-12, Nature Walks & Scouting: Grades 9-12

About Nature Notebook: Grades 9-12
Outdoor work is established or continued as a lifelong habit. Optional resources are provided in science lessons and on the Alveary bookshelf.

About Nature Walks & Scouting: Grades 9-12
Outdoor work is established or continued as a lifelong habit. Optional resources are provided in science lessons and on the Alveary bookshelf.

About Biology Lessons
Alveary High School Biology guides students through all major topics in the discipline. Based on the second edition of Novare General Biology, the Alveary course incorporates living engagement and special attention to citizenship, problem-solving, and communication skills for a complete Charlotte Mason science course. Members that already have the first edition of the text should be sure to keep their lesson plans for future use!

About Biology Labs
Labs are an essential part of science in which students engage with the Things they are reading about and practice the scientific method. Labs for this course are integrated into the lessons to facilitate adequate time for more involved activities and to better coordinate with the lessons.

Placement & Combining Tips

Nature Notebook: Grades 9-12
Learners may be combined and follow their own interests.

Nature Walks & Scouting: Grades 9-12
Learners may follow their own interests or follow the plan of their local scouting troop or natural history club.

Biology Lessons
There are no specific prerequisites or concurrents for this course, but there are a number of complex ideas that are difficult without some prior experience. A course with some exposure to basic chemistry is recommended before enrollment in Biology.

Scheduling

GRADE	SCHEDULE INFO.	BOOKS
9-12	Nature Notebook: Grades 9-12 1+ time/week 20 min+	
9-12	Nature Walks & Scouting: Grades 9-12 1 time/week 30 min+	
10-12+	Biology Lessons 5 times/week 45 min	The Biology Coloring Book The Spirit of the Rainforest General Biology, 2nd Edition The Fool and the Heretic
10-12+	Biology Labs 1 time/week 60 min	Alveary Biology Lab Book

Sample Weekly View

Day 1	Day 2	Day 3	Day 4	Day 5
Science: Biology				
Biology Lessons	Biology Lessons Nature Walks & Scouting: Grades 9-12	Biology Lessons	Biology Lessons Nature Notebook: Grades 9-12	Biology Lessons Biology Labs

Planning & Prep

Permission to print for non-commercial use. See Alveary group use policy to use lessons in a group context.

LINKS: Click text or scan the QR code in the top corner of the lesson plan pages to view online resources associated with the lessons.

Responsibility for previewing all links rests with the teacher. All links were checked at the time of publication; however, websites change frequently and may contain objectionable content. Please report broken links by contacting us through our website.

Biology Lessons
☐ Carve out time to continue or establish the regular habit of spending time in nature, including the use of a nature journal, as appropriate.

☐ Obtain materials from the supply lists.

☐ Plan for discussion and engagement. Teachers who do not feel that they can discuss the subject of this course with students should plan to either pre-read the material or complete the course alongside their students. Expertise is not necessary, but discussion is as important in math and science as in history and literature.

☐ Labs/activities are presented in a fully integrated state in which they are connected to the lessons. To use them in this way, it is helpful for the lab to be scheduled after the 5th lesson. If your lab time is earlier in the week and you will find it difficult to be flexible, plan to delay the start of the lesson schedule so that lab day occurs after the 5th lesson. For example, if your lab time is on Tuesday, you might begin lesson 1 on Wednesday of the first week of school rather than on Monday. Those wanting to use the labs/activities on a more flexible schedule can do so, but should be ready and able to adjust lesson connections.

☐ Select a science book from the Alveary bookshelf for personal reading time, as appropriate.

Term Prep & Teacher Tips

Biology Lessons
☐ Gather household items, typically easy for students to scavenge or teachers to obtain locally:
- any living plant specimen found nearby
- any non-living specimen
- red onion (Term 1)
- kitchen knife
- distilled or deionized water
- paper towels
- lamp or bright light
- strawberries (Term 1)
- salt
- a variety of colors of small Lego bricks
- computer access
- stopwatch, such as those found on most electronic devices
- cereal O's
- small bread cubes or mini marshmallows
- chopsticks
- fork

Reminders

Biology Lessons
☐ Note that Lab in week 5 calls for red onions and Lab in week 8 for strawberries. Make a note in your calendar if you will need to purchase these closer to the appropriate time. Refer to the

lab book for more details.

☐ Note that the Keys (provided in Quick Links) are for the 1st edition. The overall content in the two editions is very similar, but the numbering of chapters is slightly different, especially as learners reach Term 3. When using the Keys, teachers should attend to the topics rather than relying on the numbering.

Books & Resources

For book rationales and purchase options, click the Book List link or scan the QR code below.

∞ View Book List Details

Science: Biology

Biology Lessons


The Biology Coloring Book

The Spirit of the Rainforest


General Biology, 2nd Edition

The Fool and the Heretic

Biology Labs


Alveary Biology Lab Book

Supplies

For supply list details and basic supplies helpful to have on hand, click the links or scan the QR code below.

∞ View Basic Supplies

∞ View Supply List Details

Science: Biology

Alveary High School Biology Kit


Elodea


Household Items - Science: Biology


Prepared Microscope Slides


Frog Dissection Specimen


Student Microscope

Biology Labs


Slides and Coverslips


Safety Goggles

Quick Links

Click THIS text or scan the QR code for links.

Science: Biology

- Extra Helpings
- Biology Lab Book
- AmScope Original Student Slide Key

Biology Lessons

- All Keys and Sample Answers (1st edition, see reminder in header)
- Homework Help for HS Science Students
- Contact Us for Teachers
- Alveary Bookshelf
- John Muir Laws • Nature Journaling Resources
- Seek app from iNaturalist
- SkyView Lite for iOS
- SkyView Lite for Android
- Lab Notebook Examples

Science: Biology

How To Approach

Introduce

• Learners begin each lesson with their existing knowledge. If the book or activity is new or unfamiliar, then look at the title, a picture, or guidance in the lesson plan to consider what learners think about it, drawing on previous experience. If continuing or revisiting a topic or activity, then recap.

• Take note of the chapter or section heading, and consider how the day's topic connects back to prior topic(s).

• Look back as needed. The outline of the book and even of the chapter is helpful in drawing out and connecting ideas. Learners practice making these connections as they proceed through the book.

Read

• Read or do as instructed in the lessons. Teachers should note any Teacher Tips provided.

• Use supportive strategies and educational tools to reduce frustration and better engage the mind, as appropriate. These could include, but are not limited to, the use of eBooks, pictures, audio, read-aloud, buddy reading, colored reading strips, etc.

• As they read, learners record ideas in a notebook or binder using outlines, diagrams, graphic organizers, or other methods (or a combination of methods) that suit them. These recordings can be a helpful mechanism for remembering or a mini-narration to support understanding.

• If learners do not understand a word or concept, do not worry. Try reading over the passage again, studying a picture or diagram, connecting the idea to something from real life, or practicing chapter exercises. The lab book further supports major concepts from the text.

Narrate

• Process the ideas of the lesson by explaining a concept, describing an object, retelling events, etc. Consider what the point of the lesson is before deciding what to do with it.

• Learners may use words, pictures, models, graphics, etc, to process and convey ideas in their own way.

Discuss

• Consider together any thoughts, confusion, or concerns about the passage.

• Questions/topics for further discussion are often provided in the lesson plans (or even lab books) to help. There are no right or wrong answers to these. Alternatively, many of these can be used for composition, depending on the needs of the learner and the instructional goals of the teacher.

• Note that learners may need to spend more than the allotted time engaging with or even repeating a lesson before moving on or as reinforcement at a later time. Adjust the pace as needed to feed the learner.

• Notice if there are any dates to keep for the Book of Centuries or quotes for the Commonplace Book.

Connect

• Follow any extra links, examine any sidebars in the text, look at pictures, etc, depending on learner needs and interest.

Science: Biology

How To Approach Labs

Introduce

• Before beginning, be sure that the basic rules of lab safety (as listed in the lab manual) are understood and obeyed.

• Every science lab has the same flow, which follows the scientific method and is guided by the lab book.

• Learners begin with an introduction in their lab book. How does this lab activity relate to what they have learned so far, as well as any previous experience? What will they learn from the lab? This is how hypotheses are formed.

• If learners are unsure what to do with the Introduction, it can help to dialogue with someone as they work through the ideas. Check the Chemistry Companion in the Quick Links if a video tutorial might be helpful. This year is a pilot for this video series, so videos will be added to the Quick Link throughout the year.

• Once they have had a chance to think, learners compose a prelab narration to put these introductory ideas and hypotheses into their lab notebooks. These prelab narrations may seem short and even incomplete if learners are new to keeping a lab notebook, but that is okay.

• If learners have difficulty or are easily frustrated, then consider allowing a digital notebook for typing, a scribe, or use of assistive technology, as appropriate.

• After they complete their prelab narration, learners should collect the listed materials, being sure to let teachers know if something is missing or to remind the teacher if something needs to be purchased at the store.

Lab Procedure

• Learners complete the procedure as instructed in the lab book.

• The lab gives instructions for using the lab notebook to create tables and diagrams.

Analysis & Conclusions

• The last step in the lab is to analyze the data and observations and draw conclusions from them. This postlab narration is prompted in the lab manual. Similar to the prelab narration, the concluding or postlab narration is a chance to think about and put into words. This time, learners are considering what they learned from the lab and what they could learn more about, if they were to continue.

• Teachers should engage learners with this reflection by reviewing their lab notebooks with them, discussing the science used in the lab, and demonstrating curiosity about the lab themselves.

• Depending on the interest of the learner and the priorities of the teacher, the learner might be encouraged to spend more time on those ideas of what more they could learn or it might be time to move on. Either way, it is an important part of the scientific method to reflect on what we could or would do next - our practice should help to clarify our thinking and teach that there is always more to be learned.

Science: Biology

Click THIS text or scan the QR code for links.

Term 1

WEEK 1 ⬚ **45m Biology Lessons - Lesson 1**

Materials: General Biology

PREP: Be sure you have read the Course Notes and Planning and Prep.

→ INTRODUCTION
In General Biology, much of your previous experience in science comes together. You will notice some familiar ideas and will explore many of them with greater depth than ever before. As you work through the course, note the outline of ideas in the text and the main ideas in each section, and record any definitions and important points. You should take a few minutes to review your notes at least weekly throughout the year.

→ READ, NARRATE, & DISCUSS
Read the introduction to Ch.1 and the Objectives for Section 1.1.
Then read to the end of Section 1.1, noting important terms and their definitions, copying any helpful diagrams, and recording interesting or important points. You will do this as you continue throughout the course. Note that the author of this series uses the term "Cycle of Scientific Enterprise" to refer to the process that is the Scientific Method (1.1.3). If you have completed previous levels of Alveary Science and have a working understanding of the Scientific Method from lab, you may quickly skim section 1.1.3 or simply review the process in Figure 1.6.

• **PLAN WEEKLY**
⬚ nature walk - record observations
⬚ science free read

WEEK 1 ⬚ **45m Biology Lessons - Lesson 2**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Refer to the Objectives for Section 1.2 at the beginning of the chapter.
Then read Section 1.2.1 - 1.2.2.

• **PLAN WEEKLY**
⬚ nature walk - record observations
⬚ science free read

WEEK 1 ⬚ **45m Biology Lessons - Lesson 3**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Section 1.2.3 - 1.2.7

WEEK 1 ⬚ **45m Biology Lessons - Lesson 4**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Refer to the Objectives for Section 1.3 at the beginning of the chapter.
Then, finish Ch.1 by reading section 1.3. Use any time remaining to begin the review exercises at the end of the chapter. You may answer these orally, in writing, or with pictures. If unsure about any of them, refer back to the appropriate section to reread or find the answer.

WEEK 1 ⬚ **45m Biology Lessons - Lesson 5**

Materials: General Biology

→ PRACTICE
Continue working through the review exercises at the end of Ch.1.

Science: Biology

Click THIS text or scan the QR code for links.

Term 1

WEEK 1 ⬚ **60m Biology Lessons - Lesson 6**

Observing Living and Nonliving Things

Materials: High School Biology Lab Book and materials listed within, and The Biology Coloring Book

PREP: Read Student/Teacher Tip

→ LAB DAY
Complete Lab 1. Color plate 1 in your coloring book, as time permits.

★ TEACHER/STUDENT TIP
Note that there are 3 activity days next week: Lessons 7-9. Two of these require outdoor work. You may move Week 2 to accommodate the weather, as needed. If you need to adjust for a rainy day in your forecast for the week, then Lesson 7 can be moved to another day of the week.

WEEK 2 ⬚ **45m Biology Lessons - Lesson 7**

Materials: Article link

→ READ, NARRATE, & DISCUSS
∞ Article Link: In the Laboratory

Study any natural object, recording what you see. When you think you have noticed all that you can, try to observe more. What else can you see? You may use field guides, handbooks, etc., to aid your study today, if desired.

WEEK 2 ⬚ **45m Biology Lessons - Lesson 8**

Materials: Article links

→ INTRO
A BioBlitz is a biological inventory where scientists find and identify as many species as possible in a specific area during a specific time. If you'd like to learn more about it, you can read the National Geographic article linked. A bigger question is why scientists would take such an inventory, however. To understand that, read the article on current events from Science News Explores.
∞ Article Link: BioBlitz

→ READ, NARRATE, & DISCUSS
Read the article entitled, "Some Spikes in Malaria Cases May Be Due to Amphibian Die-off" from Science News Explores
∞ Article Link: Some spikes in malaria

→ FIELDWORK
Your BioBlitz will last for 1 day, so choose your area carefully based on how many scientists will be keeping inventory and what you plan to record. You may inventory all species or focus on only one type of object (e.g., plants, insects, birds, etc.). You will only briefly observe, identify, and document each object in your lab notebook - you will not journal on individuals as in Lab 1. Today, decide what you will inventory and plan how you will collect your BioBlitz data. Collect any special materials or equipment that you might need, such as a magnifier or field guide. Then, begin by writing an introductory narration in your notebook and getting an overview of the area. You might want to sketch a landscape or make a map of the area, noting any landmarks.

WEEK 2 ⬚ **45m Biology Lessons - Lesson 9**

Materials: anything needed for data collection

→ FIELDWORK
Collect your BioBlitz data.

Science: Biology

Click THIS text or scan the QR code for links.

Term 1

WEEK 2 ⬚ **45m Biology Lessons - Lesson 10**

Materials: graph paper or spreadsheet

→ DATA ANALYSIS
Analyze your BioBlitz data. Do you want to make a table or chart of the data? How can you best represent what you noticed? Do you think your data would be different in a different location or time of year? How could you find out?

WEEK 2 ⬚ **45m Biology Lessons - Lesson 11**

Materials: Links

→ REPORT WRITING
Write a report indicating the results of your BioBlitz. Your report should have an Introduction explaining the purpose of the field study, a Procedure explaining your location and time, any methods (e.g., sample collection, identification, etc.), and any special equipment used in your study, Results indicating your findings, and Analysis and Conclusions explaining interesting observations, introducing any questions, and sharing whatever conclusions you came to. There is an example in the link. The article links we started with are also provided if you want to refer back to them. You may work on this report during Lesson 12, as well.

∞ Link: Sample Lab Report
∞ Article Link: BioBlitz
∞ Article Link: Some spikes in malaria

★ TEACHER/STUDENT TIP
Note that there are 3 activity days next week: Lessons 7-9. Two of these require outdoor work. You may move Week 2 to accommodate the weather, as needed. If you need to adjust for a rainy day in your forecast for the week, then Lesson 7 can be moved to another day of the week.

WEEK 2 ⬚ **60m Biology Lessons - Lesson 12**

Materials: Report from previous lesson

→ REPORT WRITING
Complete your report. Review and edit it to make improvements before turning it in. While editing, be sure you have used complete sentences and avoid using the first person. In technical writing, such as this, the sentence "I tied the string to the end of the meter stick" should be rephrased, "The string was tied to the end of the meter stick."

WEEK 3 ⬚ **45m Biology Lessons - Lesson 13**

Materials: General Biology

→ NOTE
If you completed Introductory Chemistry, you may find that much of Ch.2 is a review with some application to biological systems. If you have not yet completed Introductory Chemistry, you may need to take this chapter more slowly.

→ READ, NARRATE, & DISCUSS
Read the introduction to Ch.2 and the Objectives for Section 2.1. Note important terms and their definitions, copy any helpful diagrams, and record any interesting or important points.
Then read sections 2.1.1 - 2.1.2, working the examples in the text. Always work the examples in the text as you read because these help to ensure understanding.

If you have time remaining, begin to work through the Exercises at the end of the chapter for 2.1. For general practice and review, note that

• **PLAN WEEKLY**
⬚ nature walk - record observations
⬚ science free read

Term 1

coloring plates 4-21 cover the material in Ch.2. You can use any plates like these that are not scheduled when you need some extra practice or review.

WEEK 3

⬚ **45m Biology Lessons - Lesson 14**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Section 2.1.3. Read and copy any diagrams that you think are helpful to your understanding.

Then, continue work on the Exercises for Section 2.1, as time permits.

• **PLAN WEEKLY**
⬚ nature walk - record observations
⬚ science free read

WEEK 3

⬚ **45m Biology Lessons - Lesson 15**

Materials: General Biology

PREP: Read Teacher Tip

→ READ, NARRATE, & DISCUSS
Refer to the Objectives for Section 2.2 at the beginning of the chapter. Read 2.2 and copy any diagrams that you think are helpful to your understanding.

Then work on the Exercises for Section 2.2, as time permits.

★ TEACHER TIP
Learners encounter a lot more technical content at this disciplinary stage. If they do not remember or fully understand every detail, that is okay. Can they talk about it and explain their thinking? Do they know how to go back and find what they need if they need it? Are they able to lean into the uncertainty with curiosity and a habit of problem-solving? If you are unsure about their progress, reach out through Contact Us.

WEEK 3

⬚ **45m Biology Lessons - Lesson 16**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Refer to the Objectives for Section 2.3 at the beginning of the chapter. Read sections 2.3.1 - 2.3.2

Then work on the Exercises for Section 2.3, as time permits.

★ STUDENT REMINDER
Don't forget to use Homework Help in your Quick Links if you need any help or to offer a thought for discussion.

WEEK 3

⬚ **45m Biology Lessons - Lesson 17**

Materials: General Biology

→ READ, NARRATE, & DISCUSS
Finish Section 2.3

Then work on the Exercises for Section 2.3, as time permits.

WEEK 3

⬚ **60m Biology Lessons - Lesson 18**
Collecting Properties of Water

Materials: High School Biology Lab Book and materials listed within

→ LAB DAY
Begin Lab 2.