

Science

Nature Notebook
Nature Walks & Scouting
Food Science Lessons
Food Science Labs

SAMPLE





About the Course

This course includes the following topic(s): Food Science Lessons, Food Science 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 Food Science Lessons

An elective in Physical Science, Food Science introduces learners to applications in chemistry and physics as they relate to cooking and baking, while incorporating historical context, modern developments, current events, and citizenship. This is a hands-on course that requires independent interest and some flexibility for work time in the kitchen. There is room for teachers and learners to adjust the course for personal needs and preferences.

About Food Science Labs

Note that labs are an essential part of science in which students engage with the Things they are reading about and practice the scientific method.



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.

Food Science Lessons

There are no specific prerequisites or concurrents for this course.



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+	
9-12	Food Science Lessons 5 times/week 45 min	Salt, Fat, Acid, Heat: Mastering the Elements of Good Cooking The Elements of Baking Gullah Geechee Home Cooking: Recipes from the Matriarch of Edisto Island Mexico in Your Kitchen Classic Russian Cooking Pomp and Sustenance Celtic Folklore Cooking Culinary Reactions: The Everyday Chemistry of Cooking

GRADE	SCHEDULE INFO.	BOOKS
9-12	Food Science Labs 1 time/week 60 min	

Sample Weekly View

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

Food Science 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.
- The lab period is the student's opportunity to prepare a meal (or part of a meal, depending on teacher preference). Therefore, it should be scheduled at a time when there will be people to eat what they prepare, which may not be during their school day.
- Select a science book from the Alveary bookshelf for personal reading time, as appropriate.
- Bookmark or print Quick Links, as needed.

Term Prep & Teacher Tips

Food Science Lessons

- Gather household items, typically easy for students to scavenge or teachers to obtain locally:
 - basic cookware and bakeware (pots, pans, baking sheets, mixing bowls)
 - basic cooking utensils (mixing spoons, spatula, tongs, knives, measuring cups and spoons, whisk, meat thermometer)
 - kitchen scale
 - mortar and pestle
 - salt and pepper
 - romaine lettuce (Term 1 Week 1)
 - anchovies (Term 1 Week 1)
 - mayonnaise or an egg to make fresh (Term 1 Week 1)
 - garlic clove (Term 1 Week 1)
 - lemon juice (Term 1 Week 1)
 - white wine vinegar (Term 1 Week 1)
 - parmesan cheese (Term 1 Week 1)
 - Worcestershire sauce (Term 1 Week 1)
 - olive oil (Term 1 Week 1)
 - bread of your choice (Term 1 Week 1)
 - dinner protein of your choice (Term 1 Week 1)
 - ingredients by student choice (students are prompted to make a grocery list most weeks)
 - optional: additional kitchen tools as indicated in cookbooks, depending on recipes chosen by students

Reminders

Food Science Lessons

□ Note that Lab in week 1 calls for lettuce, anchovies, mayonnaise/egg, garlic clove, lemon juice, white wine vinegar, parmesan cheese, Worcestershire sauce, olive oil, and bread and dinner protein of choice. Additional grocery lists will be provided by the student throughout the year.



Books & Resources

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

∞ [View Book List Details](#)

Science: Food Science

Food Science Lessons



Salt, Fat, Acid, Heat: Mastering the Elements of Good Cooking



The Elements of Baking



Gullah Geechee Home Cooking: Recipes from the Matriarch of Edisto Island



Mexico in Your Kitchen



Classic Russian Cooking



Pomp and Sustenance



Celtic Folklore Cooking



Culinary Reactions: The Everyday Chemistry of Cooking



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](#)

(No Subject Supplies Assigned)



Quick Links

Science: Food Science

∞ [Extra Helpings](#)

Food Science Lessons

∞ [America's Test Kitchen Library](#)

∞ [The Loopy Whisk](#)

∞ [Samin Nosrat Cooking](#)

Click [THIS text](#) or scan the QR code for links.



- ∞ [Food & Wine](#)
- ∞ [Science News Explores](#)

SAMPLE

Science: Food Science

How To Approach



Introduce

- If starting a new book or a new topic in the book, then look at the title or a picture and take a moment to consider previous ideas and experiences.
- If continuing a previous reading, recap what was read previously. Often, the title of the book's section can help to draw out the main idea.



Read

- Read or do, as instructed in the lessons, making note of or flagging unfamiliar terms, interesting ideas, important dates, inspiring quotes, etc.
- 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/field work further supports major concepts from the text.



Narrate

- Process the ideas of the lesson by retelling, defining a concept, explaining the links in a chain of thought, etc. Do this orally or silently to yourself.
- Use words, pictures, outlines, etc.
- If a particular idea cannot be narrated, then read or examine the text again.



Discuss

- Consider with the teacher any thoughts, confusion, or concerns about the passage.
- If understanding is still uncertain, try rereading the passage or do some personal research on the topic.



Connect

- Follow any extra links, examine any sidebars in the text, or pursue additional reading, depending on student interest.

Science: Food Science

How To Approach Labs



Introduce

- Regardless of how many days are required to complete a particular activity, every Science Lab has the same flow, which follows the scientific method.
- Relevant concept(s) are introduced in the text.
- Your notebook entry begins with the introductory/prelab narration, including relevant information that you have read or previously experienced, what you plan to do in the lab, and any hypothesis or anticipated result.



Lab Procedure

- Perform the procedure according to the instruction, recording in your notebook what you do as it happens. This can be a challenge, but is an extremely important skill.
- Record all data and observations in the lab notebook.



Analysis & Conclusions

- After all data is collected, analyze the results by considering how the data reflects the introduced concepts and whether the hypothesis is supported by the data.
- If the data and observations do not support the hypothesis, reflect on why and what further testing would be interesting or helpful.



Term 1

WEEK 1 45m Food Science Lessons - Lesson 1

Preparation

Materials: Video Link

→ INTRO

Your lessons are organized to teach you the basics in Term 1 and then encourage exploration in Terms 2-3. If you prefer to spread out the readings in Term 1, there is room to do so. Feel free to work at your own pace.

As we start our kitchen adventure, it is important to remember that we are also investigating as scientists. Let's watch a portion of this public lecture from the Science & Cooking lecture series at Harvard to get us in the mindset that the best chefs must be scientists, too.

→ VIEW, NARRATE, & DISCUSS

Watch a portion of the first Science and Cooking lecture:
∞ Video Link: Science and Cooking (5:45-57:14)

• PLAN WEEKLY

- take a nature walk
- science free read

WEEK 1 45m Food Science Lessons - Lesson 2

The Science of Cooking

Materials: Salt, Fat, Acid, Heat

→ INTRO

In this book, a chef leads students through 4 important "elements" of cooking: salt, fat, acid, and heat. The first 3 are families of chemical substances, while the last is really about adding energy. If you have already taken Chemistry, think about what you've already learned about salt, fat, acid, and heat as you observe the roles they play in cooking. If you haven't yet taken Chemistry, you'll learn a few basics here and will get to make lots of observations that will support any future study in the subject.

→ READ, NARRATE, & DISCUSS

p.17-28

→ VIEW

∞ Video Link: America's Test Kitchen
∞ Video Link: Alveary Chemistry Companion

WEEK 1 45m Food Science Lessons - Lesson 3

The Science of Cooking

Materials: Salt, Fat, Acid, Heat

→ READ, NARRATE, & DISCUSS

p.29-39

WEEK 1 45m Food Science Lessons - Lesson 4

The Science of Cooking

Materials: Salt, Fat, Acid, Heat

→ READ, NARRATE, & DISCUSS

p.40-55



Term 1

WEEK 1 ☐ 45m Food Science Lessons - Lesson 5

The Science of Cooking & Baking

☐ Materials: Salt, Fat, Acid, Heat, Elements of Baking

→ PREPARE

Choose a 'Salt Lesson' recipe from p.428 of SFAH for next week. Then decide what else you will serve to balance the meal. Healthy Eating Plate (linked) may help; for more information about the history of dietary guidelines, the newly released U.S. guidelines, or Canadian guidelines, check out the other optional links. Be sure to make a shopping list for your teacher.

∞ Website Link: Healthy Eating Plate

∞ Website Link: Illustrating Diet Advice is Hard

∞ Website Link: Dietary Guidelines for Americans

∞ Website Link: Canada's Dietary Guidelines

Then begin Elements of Baking:

→ INTRO

In the second text for this course, a chemist leads students through studies in baking with the mindset of a materials chemist: we observe the physical properties of various materials and experiment with how they perform in various situations to work toward a desired product. The approach is the same whether we are developing new adhesives for space shuttle tiles, new polymers for biomedical applications or textiles, or new recipes for friends and family.

Note the organization of EB on p.13. Feel free to flip around so that you understand how the book is organized and where to find what you want.

Read p.15. Note that you will measure by weight in this course. In science, we experiment, and the accuracy and precision of weight measurements will ensure that we can draw conclusions from our experiments.

→ READ, NARRATE, & DISCUSS

p.19-23

WEEK 1 ☐ 60m Food Science Labs - Lesson 1

☐ Materials: Salt, Fat, Acid, Heat, ingredients for Caesar Salad p.48, protein, bread, indicated kitchen supplies

→ KITCHEN LAB

We'll learn more about salads in the coming weeks, but for this week, make Caesar Salad as on p.48-49 in SFAH. You may either use store-bought mayo for now or try the recipe (visual p.86-87 or traditional p.375). Serve alongside your choice of protein and bread/croutons. If you want to make your own mayonnaise, you might find the video below helpful.

∞ Video Link: Mayonnaise and the Science of Emulsions

WEEK 2 ☐ 45m Food Science Lessons - Lesson 6

The Science of Baking

☐ Materials: Elements of Baking

→ READ, NARRATE, & DISCUSS

Ch.2 p.37-44

● PLAN WEEKLY

☐ take a nature walk

☐ science free read



Term 1

WEEK 2 ☐ 45m Food Science Lessons - Lesson 7

The Science of Baking

☐ Materials: Elements of Baking

→ READ, NARRATE, & DISCUSS

Ch.3 p.48-49. Read once before case studies, but you will come back to them after (or even during) case studies as you develop understanding. Make sure you understand WHY the points on p.49 are so.

→ PLAN

Look over p.50-51: In addition to Buttery Vanilla Cake, select 3 items from the pink boxes which you are familiar with or interested in (except bread, which we'll get to later, and waffles).

→ PREPARE

Read over the rules for Buttery Vanilla Cake (p.52-54) and your 3 additional items, noting how the rules apply the science of ingredients from Ch.2, how the vegan and gf-vegan rules combine the first 3, and how the rules are the same/different between items.

Refer to p.91 for a Table of Contents of case studies to locate the recipe pages for your 3 selections. Note that a table of the ingredients needed for different variations is printed toward the end of the case study (p.104 for Buttery Vanilla Cake). You can choose whatever variations most interest you, but the key to learning the science is to try different variations because we have to change a variable to see what happens. Add any needed ingredients to your shopping list.

WEEK 2 ☐ 45m Food Science Lessons - Lesson 8

The Science of Baking

☐ Materials: Elements of Baking

→ READ, NARRATE, & DISCUSS

Ch.4 p.88-89

Buttery Vanilla Cake p.92-105. Even if you aren't planning to do all of the variations, reading about the role the ingredients play is important!

WEEK 2 ☐ 45m Food Science Lessons - Lesson 9

The Science of Baking

☐ Materials: Elements of Baking, indicated ingredients, and kitchen supplies

→ BAKING DAY!

Prepare Buttery Vanilla Cake, recording what you do and what you observe in your notebook.

WEEK 2 ☐ 45m Food Science Lessons - Lesson 10

The Science of Baking

☐ Materials: Elements of Baking

→ ANALYZE

- Review how the bake went, reread, and plan any adjustments that you want to try next week.
- Add frostings and creams from Ch.10, if desired.
- Add to shopping list, as needed.
- If you want to decide on your Salt Lesson recipe for next week, you

Science: Food Science

[Click THIS text or scan the QR code for links.](#)



Term 1

could do this now, or you could wait until after dinner night. You could try one of these first two again or try a new one. Add to shopping list, as needed.

WEEK 2 60m Food Science Labs - Lesson 2

Materials: Salt, Fat, Acid, Heat, indicated ingredients, and kitchen supplies

→ KITCHEN LAB

Prepare the chosen Salt Lesson. Decide on next Salt Lesson p.428 and add to shopping list, if you haven't already.

WEEK 3 45m Food Science Lessons - Lesson 11

The Science of Baking

Materials: Elements of Baking

→ READ, NARRATE, & DISCUSS

Ch.5 p.259-266, p.267-268 (optional)

• PLAN WEEKLY

- take a nature walk
- science free read

WEEK 3 45m Food Science Lessons - Lesson 12

The Science of Baking

Materials: Elements of Baking

→ READ, NARRATE, & DISCUSS

Ch.5 p.269-275

WEEK 3 45m Food Science Lessons - Lesson 13

The Science of Baking

Materials: Elements of Baking, indicated ingredients, and kitchen supplies

→ BAKING DAY!

Prepare Buttery Vanilla Cake, including any changes or adjustments noted last week. Record what you do and what you observe in your notebook.

WEEK 3 45m Food Science Lessons - Lesson 14

The Science of Baking

Materials: Elements of Baking

→ ANALYZE

- Review how the bake went, reread, and plan any adjustments that you want to try next week OR
- Select your next case study by reading any introduction, as well as the recipe (you will have more time to finish reading later, but don't wait to add to the shopping list, as needed). Even though you have read about bread in the gluten-free chapter, complete your case studies before moving on to bread, as this brings in new material to consider (psyllium husk).

WEEK 3 45m Food Science Lessons - Lesson 15

The Science of Cooking

Materials: Salt, Fat, Acid, Heat

→ READ, NARRATE, & DISCUSS

p.205, 208-223




Term 1

→ PLAN

Consider your Salt Lesson for this week. Will you use any of the ideas in this reading for the recipe? If not, you can always come back to them in a future recipe.

If you want to decide on your Salt Lesson recipe for next week, you could do this now, or you could wait until after dinner night. You could try one of these first two again or try a new one. Keep in mind that any salad can be a Salt Lesson, so feel free to experiment with the Ideal Salad (p.216) or Avocado Matrix (p.222). Add to shopping list as needed.

WEEK 3 60m Food Science Labs - Lesson 3

 Materials: Salt, Fat, Acid, Heat, indicated ingredients, and kitchen supplies

→ KITCHEN LAB

Prepare the chosen Salt Lesson. Decide on next Salt Lesson p.428 and add to shopping list, if you haven't already.

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