BSCS Biology
Understanding for Life

Teacher Handbook

BSCS SCIENCE LEARNING
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COURSE OVERVIEW

BSCS Biology: Understanding for Life is the next generation in a line of inquiry-based *BSCS Biology* programs dating back more than 60 years. Throughout our history, BSCS has always presented the next generation of inquiry-based, research-driven high school biology programs to teachers and students. This version of *BSCS Biology* is an all-new program designed for the Next Generation Science Standards (NGSS), but it is so much more.

GOALS

Meeting Standards Since our founding, BSCS has advocated for teaching students how to do the practices of science in addition to learning the concepts of science. But even more, we have always advocated that students should learn the concepts of science by doing the practices of science themselves. Our organization has a history of developing science programs that put this inquiry-based learning into practice, conducting research to improve our programs, and then developing and disseminating improved inquiry-based science learning programs. So, it was welcome news to us when a consortium of 26 states released the NGSS, calling for learning that integrates the three dimensions of disciplinary core ideas, crosscutting concepts, and science and engineering practices in a form that matches our vision of inquiry-based learning.

This program has been designed to achieve all of the performance expectations in the NGSS for life science at the high school level through an approach that matches the vision of three-dimensional learning in the NGSS.

While we design for standards at BSCS, we also design for other goals that we value. This course has been designed to achieve the following goals.

Preparation for the Future As its subtitle, *Understanding for Life,* suggests, *BSCS Biology* is not just designed to prepare students for future study. It is designed to prepare students for the use of scientific concepts and practices throughout their lives. *BSCS Biology* has been designed with the explicit goal of preparing students to make well-informed and well-reasoned decisions in their personal, professional, and civic lives.

Support for Teacher Learning and Implementation Another goal is to provide teachers with the support and information that you require to teach your students effectively. We recognize that the Next Generation Science Standards and the instructional approach that we have used in writing this course will be new for most teachers who use this program. In fact, they represent a substantial shift for most of you. We do not expect teachers to be able to make this shift overnight. We recognize that it will be a process of learning and development. It is critically important to us, though, that you are successful in making that shift. So, we have dedicated considerable time and energy (and pages of text!) to providing you with information and supports to help you make those shifts.

The Teacher Handbook, to which this is the introduction, is just one component of that support for teachers. In the remainder of this introduction, we provide an overview of the goals and approaches that we have taken in crafting this program for you and your students. In the rest of this Handbook, in the front matter for each unit's teacher guide, and in the bodies of the teacher guides themselves, we provide extensive background material, rationale for why we've designed each component as we have, tips for how to implement instruction, and ideas for how to customize instruction for your context and students.

Support for Student Engagement Every educator knows that students must be engaged to learn, but engagement is a perpetual challenge. At BSCS, we set a higher threshold than just ordinary engagement in which students simply complete the tasks assigned to them by the teacher. We are committed to fostering the deep and sustained learning that students will be able to apply long after the completion of the course. We understand that achieving this goal requires a form of engagement that only comes when students recognize that what they are learning will be valuable to them in the future, and they engage for reasons beyond task completion. Therefore, we design to connect to the values of our students. In the case of *BSCS Biology*, we have designed our units around personal, community, and societal challenges that students recognize are important for them, their communities, and the world. Two of our units focus on challenges to human health, and two focus on the sustainability of human and ecological systems.

Support for Student Development The NGSS ask educators to support learning of disciplinary core ideas, science and engineering practices, and crosscutting concepts. But they don't stop there. They also ask us to support the development of a *scientific identity*. In this version of *BSCS Biology*, we seek to break down the barriers that have historically caused most American adults to think of science as something that only a small percentage of people do or like by enabling all students to have the experience of doing and enjoying meaningful science themselves.

We also want them to develop *scientific agency*, which means believing in their own ability to "do science" to achieve a goal. In practice, scientific agency could play out in a wide range of ways: for example, making a decision about a medical treatment based on research results or evaluating the arguments for and against a ballot initiative that has implications for the local environment.

Equity Throughout American history, access to scientific learning, identity, and agency have been unevenly and unfairly distributed across the population. This has resulted in the perpetuation of inequities based on race, ethnicity, gender, sexuality, age, ability, location, and other attributes. Further, this unfair distribution of opportunity has created challenges to efforts to redress the inequities as a result of distrust and alienation among its victims. BSCS's goal in the creation of this program has been to, as much as possible, reverse these inequities through choices about the phenomena and examples we use to create contexts for learning, through the classroom culture and norms that we encourage, and through supports for diverse students and learning contexts.

APPROACH

Even a quick flip through the materials for *BSCS Biology: Understanding for Life* reveals that the pedagogical approach is different from typical high school biology programs. It does not have a table of contents that reads like an outline of biology concepts and the chapters do not consist of scientific explanations separated by questions and exercises. It is activity-based, which means that chapters consist of sequences of activities in which students construct explanations of phenomena through investigations and discussions. The student books do include readings and scientific explanations, but we include them as supports for learning, not as the primary source of learning.

The pedagogical approach that we used to design *BSCS Biology: Understanding for Life* is called *Anchored Inquiry Learning*. The learning in this course is *anchored* because all the learning is anchored in problems that require solutions and phenomena that require explanations. Each unit begins with the introduction of a problem to solve or a phenomenon to explain, and every lesson starts and ends by making a connection to the larger goal of solving the unit's anchoring problem or explaining its anchoring phenomenon.

The learning in this course is *inquiry learning* because students conduct investigations to generate the majority of the information that they need to construct their own understanding of science. In a direct reflection of the vision of science learning called for by the National Academies in the *Framework for K-12 Science Education* and the coalition of states that developed the NGSS, students learn by engaging in science and engineering practices. In an iterative process, they develop understanding of disciplinary core ideas (DCIs) and crosscutting concepts (CCCs) through the use of science and engineering practices (SEPs). Furthermore, they learn to engage in SEPs at increasingly sophisticated levels over time and become more facile with them through repeated practice.

Three practices are particularly central to Anchored Inquiry Learning: (1) *asking questions and defining problems*, which is used in conjunction with anchoring problems and phenomena to drive the learning process; (2) *developing and using models*, which is used to structure students' inquiry learning and provide them with representations that enable them to communicate about their developing understanding with each other and the teacher; and (3) *constructing explanations and designing solutions*, which is used to focus their learning on the creation of a meaningful product. The other five SEPs from the NGSS are used extensively throughout the course in conjunction with these three.

KEY FEATURES

As a research-driven program, *BSCS Biology: Understanding for Life* has many innovative features designed to achieve the goals listed above. The most significant is the Anchored Inquiry Learning pedagogical approach. Here we highlight four more.

Support for the Shifts Called for by the NGSS Recognizing the challenge of changing professional practice, we have incorporated a number of supports for teachers to help them make the shifts called for by the NGSS. Overall, this course is designed to be what educational researchers have dubbed *educative curriculum materials.* That is, it incorporates features designed to support learning by teachers through the acts of planning, delivering, and reflecting upon instruction.

The most visible educative feature in this course is the notes and suggestions for teachers that we have provided on every page of the teacher guide. We recognize that there are many more of these notes than any individual teacher will need in any given year, but we designed them to provide adequate support for the wide range of teacher background and experience found in US schools today, as well as the diversity of students and teaching contexts out there. On the one hand, we designed the supports so that two teachers with dramatically different levels of experience teaching in dramatically different settings will find the explanations for why we designed particular activities we have that they need, as well as suggestions for how to adapt those activities. On the other, we designed them so that both of those teachers will find information that will enable them to continue to learn in their second, third, and fourth years of using this program.

One feature of this program is that we provide scripts for facilitating activities and presentation slides that can be used to structure classroom instruction. Do not be misled by the presence of these supports. ***This is not a scripted curriculum.*** We do not believe that effective teaching can or should be scripted. We do believe that scripts and sample materials are the most efficient way for developers (us) to give teachers (you) a concrete understanding of what we are suggesting. Many teachers may choose to stick closely to the scripts and use our slides verbatim, particularly in their first year of teaching from this curriculum. But we expect many teachers to diverge from the scripts and modify or replace the slides for any number of reasons, including adapting them to their students and their locale, especially as they become more familiar with the program and comfortable with Anchored Inquiry Learning.

In the end, every teacher is the designer of instruction for their classroom, and we see our role as providing the best possible raw material for teachers to do that. We have learned over time that it is better to provide teachers with materials that may be overly specific than to provide them with materials that may be too vague, as teachers always have the option to ignore the specifics that don't suit their circumstances.

Engagement in Socioscientific Issues To help students understand the importance of life science to their lives and to provide them with sufficient motivation to wrestle with challenging science, *BSCS Biology* asks students to consider socioscientific issues. Socioscientific issues are complex problems facing society that cannot be understood or addressed without scientific understanding and practices. Each unit in *BSCS Biology* is designed around a socioscientific issue, referred to as a societal issue. Students are introduced to a unit's societal issue at the beginning of the unit, and they return to it repeatedly over the course of the unit. This allows students to monitor their progress toward being able to address the societal issue with the science they are learning and renews their motivation by reminding them of the goal of the unit. At the conclusion of the unit, they have the opportunity to apply the understanding and abilities they have gained over the course of the unit toward addressing the societal issue.

An Assessment System To enable both teachers and students to monitor and manage their progress toward learning goals, this course includes formative and summative assessments that function together as a system. At the finest grain size, at least one artifact or activity in each lesson is identified as an opportunity for formative assessment of how well students are meeting the goals for the lesson. At the chapter level, you will find opportunities for both formative and summative assessment. The chapter-level formative assessments provide students with an opportunity to assess their own understanding as they begin the lesson that is designed to help them synthesize what they've learned in the chapter so far. The chapter-level summative assessments require students to use disciplinary core ideas, practices, and crosscutting concepts to make sense of phenomena. At the unit level, students transfer the target concepts and practices to a novel context on a performance task. Together, the assessments enable you to plan, modify, and reflect upon your instruction and your students' progress, as well as enabling your students to monitor their own progress.

Support for Equitable Instruction To assist teachers in removing barriers to science learning and the development of scientific identities and agency for students in groups that have been denied access to science, we provide support for equitable instruction. These supports exist at multiple levels. At the highest level, the teaching practices and classroom routines that make up the Anchored Inquiry Learning approach are designed to support equitable learning. For example, the anchoring problems and phenomena have been selected to be compelling to a broad spectrum of students, with special attention to nondominant gender, racial, and ethnic identities. To address potential accessibility and language barriers, Anchored Inquiry Learning provides students with multiple ways to experience phenomena and encourages students to express their understanding through multiple modalities. At the next level, we have done our best to represent diversity of science and scientists throughout the program in ways that will support the development of science identity and agency for all students. Finally, we have placed a special focus on language and literacy in the design of activities to help teachers remove barriers to science learning that have historically disadvantaged students who are emerging multilingual learners or who have not achieved academic success in English language arts previously. You will find guidance and suggestions for these students throughout the teacher guides.

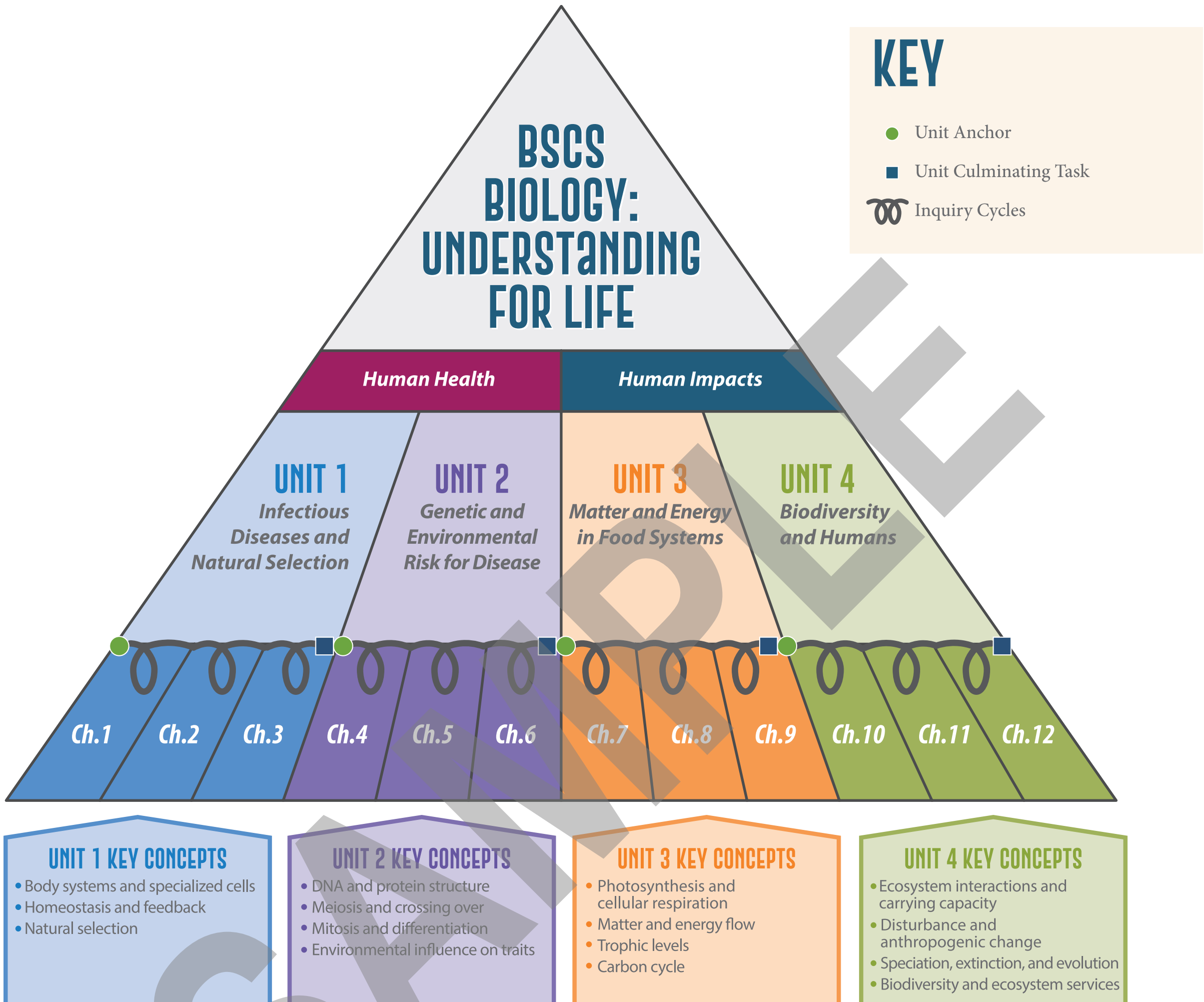
DIFFERENCES FROM PREVIOUS VERSIONS OF *BSCS BIOLOGY*

Since BSCS's founding in 1958, each version of *BSCS Biology* has been created to improve upon the current state of the art. This version, *BSCS Biology: Understanding for Life*, is the next step in that ongoing work to improve science education. For those of you who may be familiar with any of the previous versions of *BSCS Biology*, we provide a summary of how this course differs from its predecessors in the table on the next page.

Feature of *BSCS Biology: Understanding for Life*	How it is implemented
Anchored in a complex, relevant phenomenon or problem	• Students experience a complex and relevant phenomenon or problem that ◦ sparks student interest and curiosity, ◦ motivates a need to know, ◦ creates a sense of puzzlement, and ◦ raises questions for students.
Elicits and leverages students' prior knowledge and experiences	• The Anchor Lesson elicits responses that uncover what students know or think about the phenomenon or problem that can be leveraged throughout the unit. • The anchor experience provides different entry points for all students.
Follows a sequence that is coherent from students' perspective	• The lessons work together in a coherent storyline to help students explain the phenomenon or propose a solution to a problem. • The development of science ideas is anchored in the goal of explaining phenomena or designing solutions to problems.
Three-dimensional learning	• Student sensemaking of phenomena or designing of solutions is used as a window into student understanding of all three dimensions of the NGSS. • Students explicitly use the SEPs and CCCs to figure out DCIs and make sense of the phenomenon or to solve a problem. • Teachers use tasks that ask students to explain phenomena or design solutions to problems, and that reveal the level of student proficiency in all three dimensions.
Question-driven	• Student questions, prior experiences, and diverse backgrounds related to the phenomenon or problem are used to drive the lessons and the sensemaking or problem-solving. • Students develop a Driving Question Board used to guide investigations and identify gaps in understanding.
Collaborative investigations	• Students conduct multiple investigations driven by their questions that collectively lead to a deep understanding of established core scientific ideas. • Students read multiple types of text to gather evidence. • Students discuss open-ended questions that focus on the strength of the evidence used to generate claims. • Students have opportunities to share ideas and feedback with each other directly.
Model-based	• Student models include evidence gathered to support their model and show how their thinking has changed over time. • Students use their models to explain the phenomenon, reflect on their progress, and identify questions they still need to answer. • Student models show diversity in how students articulate what they have learned.
Sensemaking and literacy supports	• Supports are embedded in lessons so that all students can engage in science and engineering practices. • Vocabulary is encountered and earned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning. • Supports have fading scaffolds as students develop automaticity with the supports.
Teacher behaviors	• Encourages students to work together to figure out important science ideas. • Asks open-ended questions such as, Why do you think …? What evidence do you have? What do you know about x? How would you explain x? • Provides time for the students to puzzle through problems. • Looks for evidence that the students have changed their thinking or behaviors. • Formatively assesses students' knowledge and/or skills and allows students to assess their own learning and skills.
Student behaviors	• Answers open-ended questions by using observations, evidence, and previously accepted explanations. • Articulates understanding through successive revisions of models. • Argues for reasonable claims supported by evidence and reasoning. • Works collaboratively with peers and offers productive feedback. • Evaluates their own progress and revises thinking and models. • Applies knowledge and skills to explain similar and new phenomena.

COURSE CONTENTS

BSCS Biology: Understanding for Life is organized into four units. Each unit focuses on a phenomenon or problem that is closely linked to a societal issue.



These issues provide students with the interest-driven motivation to engage with the three dimensions of disciplinary core ideas, science and engineering practices, and crosscutting concepts. The units give students the opportunity for deep learning of science in meaningful contexts, and they also prepare students to draw on science for future study and to address challenges in their own lives and communities.

The anchor phenomenon or problem and societal issue not only set the purpose for learning at the beginning of each unit, but also continue to serve as the motivational backdrop throughout the unit. As students work through the chapters in each unit, they develop and deepen their understanding of life science core ideas in the Next Generation Science Standards at the same time that they develop and deepen their understanding and ability to apply science and engineering practices and crosscutting concepts.

Within each unit, students develop an understanding of a set of disciplinary core ideas from the NGSS high school life science standards. Across the four units, students will engage with the crosscutting concepts and science and engineering practices called for by the high school life sciences performance expectations. As a result, the four units in this course cover all of the elements of the life science performance expectations in the NGSS.

INSTRUCTIONAL APPROACH

The two central elements of the Instructional Approach in this course are the Anchored Inquiry Learning instructional model and the use of socioscientific issues to provide context and motivation. In this section we offer an overview of both of them.

ANCHORED INQUIRY LEARNING

Anchored Inquiry Learning (AIL) is an instructional model. It is designed to provide students with coherent inquiry learning experiences motivated by questions about phenomena or problems in the world.

Background and Goals

Anchored Inquiry Learning is the latest in a series of research-based instructional models developed by BSCS dating back to its founding in 1958. AIL succeeds the influential 5E model, which has served as BSCS's primary instructional model since 1987. The AIL model builds directly on the 5E model and carries forward the emphasis on learning through inquiry that has been central to BSCS's instructional models throughout its history. AIL is based on current research findings, including the research that informed the National Research Council's (NRC's) *Framework for K–12 Science Education* (NRC, 2012) and *Developing Assessments for the Next Generation Science Standards* (NRC, 2014). AIL has also been influenced by the *Next Generation Storylines* project at Northwestern University and their work on the design of instructional sequences that are organized around students' questions about phenomena (Reiser, Novak, & McGill 2017).

AIL achieves the objectives of the NGSS by enabling students to develop discipline-specific and crosscutting conceptual understandings and to master the practices that scientists and engineers use to extend scientific understanding and solve engineering problems.

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AIL achieves these outcomes by:

- Providing students with a compelling context to ask and answer questions about phenomena or to solve problems
- Guiding students as they pursue questions that will enable them to explain the phenomenon or solve their problem
- Supporting them as they develop the scientific understandings and abilities they need to answer their questions
- Providing them with the satisfaction of achieving their goal and demonstrating their newly acquired understanding and abilities

Why an Instructional Model?

An instructional model provides a structure and a set of guidelines for implementing an approach to teaching and learning In the case of AIL, the structure and guidelines are based on science education research, and they are designed to support the creation of coherent, motivated, and effective science learning experiences. For *BSCS Biology: Understanding for Life,* we used the structure of AIL to organize the lessons and units, and we used the guidelines to write them. This benefits you because the instructional model can provide you with a consistent structure to rely on and innovate from. For your students, an instructional model provides them with expectations about how their learning experiences will play out. In the ideal, the AIL instructional model will provide an increasingly comforting routine as you and your students grow more familiar with it. It will also allow you and your students to build a classroom culture that values asking questions about phenomena and pursuing those questions as a joint mission to make sense together.

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The Goals of the Anchored Inquiry Learning Model

The AIL model is based on research on how adolescents learn science and how teachers can facilitate that learning. This research describes conditions and activities that lead to deep and enduring learning. Establishing these conditions and implementing these activities in everyday school contexts are the goal of the AIL model. This program is designed to enable you to do just that.

Briefly, the goals of the AIL model are as follows:

- Motivate students to learn through compelling phenomena or problems (anchor).
- Engage them in productive learning activities (inquiry) to use science and engineering practices and crosscutting concepts to figure out science ideas.
- Enable them to organize and reinforce their learning to support future use (application, metacognitive moments to reflect).

The structures and guidelines in the model are all designed to achieve these three goals.

The Student Experience of Anchored Inquiry Learning

AIL requires students to actively engage in their own learning in ways that may feel new or different to them. The student experience will include the following four important aspects. Their experiences will

1. be driven by students' questions about phenomena or problems,
2. follow a sequence that is coherent from the student perspective,
3. require collaborative sensemaking, and
4. involve developing and revising models and explanations of phenomena along the way.

Question-driven Each unit in this program is anchored by a compelling phenomenon or problem that will raise questions for students. Students will ask and answer many of *their* questions during a unit. Students record their questions on a *Driving Question Board,* which serves as a tool to motivate inquiry and track progress throughout the unit.

Coherent from the Student Perspective This program is designed to anticipate and follow students' questions about phenomena. While the sequence through each unit is preplanned, the storyline that unfolds should feel to students like a logical journey through many of the questions they posed. This design will create conditions in which students understand why they are investigating certain questions and how figuring out answers to those questions will advance their understanding of phenomena.

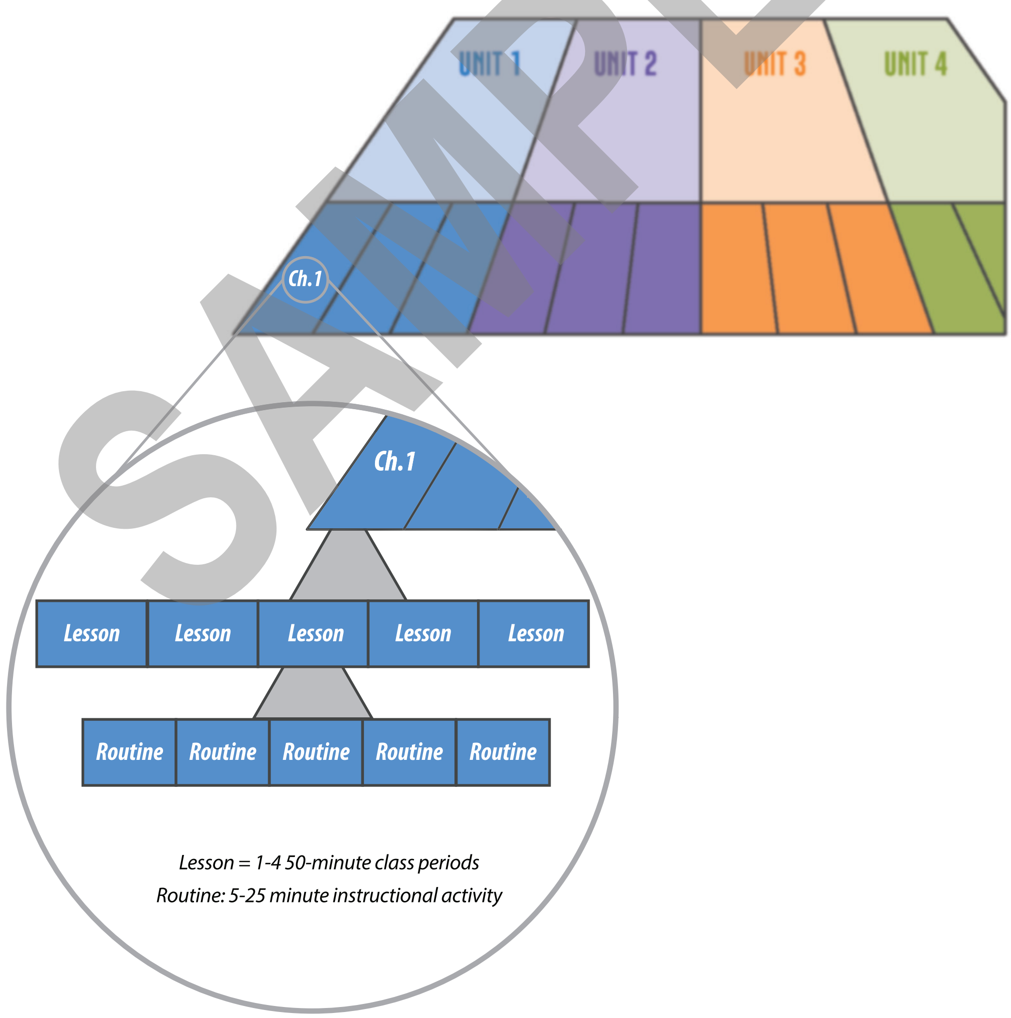
Collaborative and Social In this program, your students will work together as a community. They will recognize that their collective questions and ideas are an asset to push the community's thinking forward. Through collective sensemaking, your students will engage in scientific argumentation to carefully consider evidence, and to support science ideas with that evidence. They will learn different ways to process their own thinking, and then to communicate their ideas to their peers and to you.

Model-based At key points in the learning sequence, students articulate what they have figured out in the form of a scientific model, they document the evidence they have gathered to support their model, they use their model to explain phenomena, and they reflect on the progress they have made toward answering their questions about the anchoring phenomenon. At other key moments in the sequence, students confront limits in their understanding and identify the questions that they need to answer to fill the gaps in what they understand about the phenomenon.

These four aspects of AIL are used to help you create conditions in your classroom that support and include all students' ideas, questions, and ways of communicating their thinking. Leveraging and making use of students' contributions in this way can support students' motivation to learn and can increase their feelings of agency in their learning process. Supporting diverse students by providing equitable instruction is an important goal in the development of this program. As you read further, you will learn about how this program does even more to provide equitable instruction by supporting students across a broad range of academic backgrounds in English language arts, including emerging multilingual learners and students from diverse cultural backgrounds.

The Structure of the Anchored Inquiry Learning Model

The AIL model is used to organize the sequence of learning activities in this program. The activities throughout the program are organized within a nested structure. The smallest unit in the model is an individual *routine* that guides a learning activity. A sequence of routines composes a *lesson.* A sequence of lessons composes a *chapter,* a sequence of chapters composes a *unit,* and a sequence of units composes a *course.*



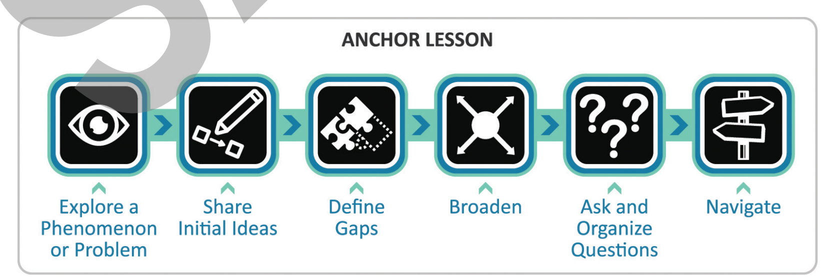
Course structure

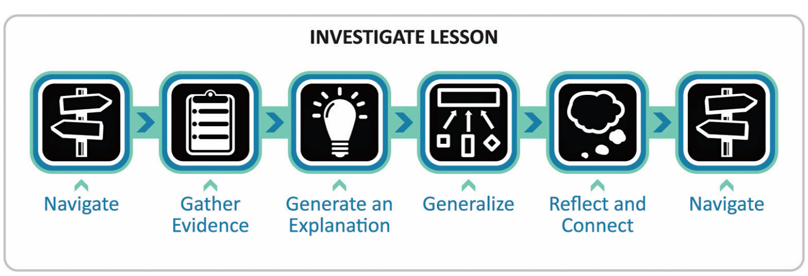
AIL Lesson Types Let's explore this nested structure by looking closer at lessons first. This program uses five types of lessons. Each type of lesson serves a specific purpose in the instructional sequence and each type is composed of specific routines that achieve that purpose. When sequenced together, the lessons engage students in inquiry cycles to help them iteratively refine a model and explanation of phenomena.

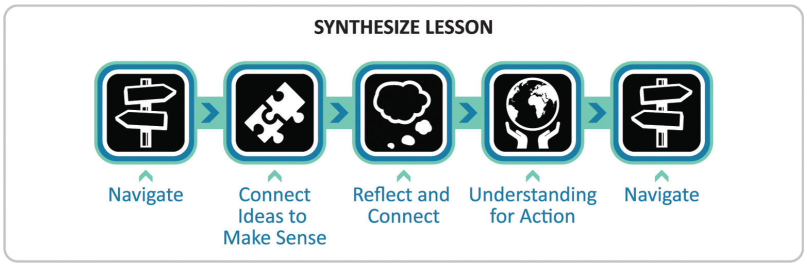
Anchored Inquiry Learning Lessons

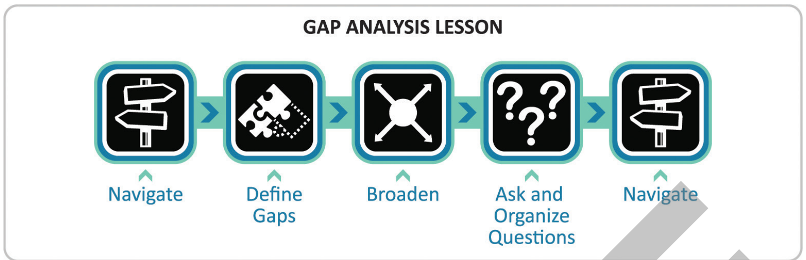
Type	Role in the model
Anchor	The anchoring phenomenon lesson ("anchor" for short) motivates a "need to know" and sparks student interest and curiosity. It should create a sense of puzzlement for students and raise questions for students. The Anchor Lesson is also an opportunity for you to get a sense for what students already understand about the phenomenon that can be leveraged throughout the unit.
Investigate	Investigate Lessons engage the class in shared experiences that provide a common base through which students can explore their current conceptions about the phenomenon or problem. In these lessons, students gather evidence that can be used to develop explanations or design solutions, add to models, engage in argumentation or communication, and generate new questions.
Synthesize	Synthesize Lessons happen at key moments in instruction when the class has figured out several important science ideas to explain the anchoring phenomenon or problem. These lessons focus on consensus building among students, helping them to make connections between ideas, and using their emerging knowledge to revise an explanation or model of the phenomenon or to propose or revise solutions.
Gap Analysis	A Gap Analysis Lesson gives students an opportunity to recognize limitations in their own understanding and motivates the need for additional information or evidence. In many ways, these lessons act similarly to an Anchor Lesson because they spark an additional "need to know."
Culminating Task	The Culminating Task Lesson allows students to use their revised model, explanation, or design ideas to explain a relevant and meaningful related phenomenon or to propose a solution to a relevant and meaningful problem associated with the unit societal issue.

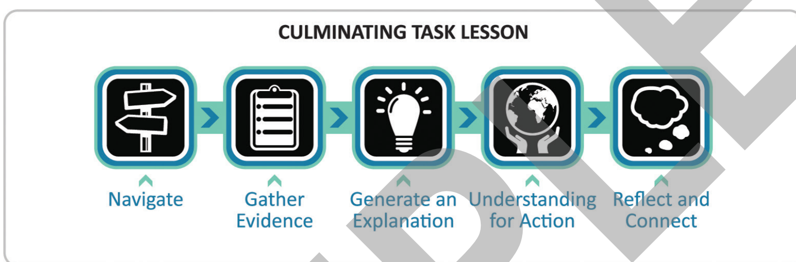
AIL Routines A smaller component than lessons, *routines* are used to guide individual learning activities. As you learn more about this program, you will start to notice that each kind of AIL lesson is composed of a suggested sequence of these routines. For example, all Investigate Lessons consist of a set of routines that include *Navigate* into the lesson, *Gathering Evidence*, *Generating an Explanation,* and *Navigate* to the next lesson. There are some optional routines, as well, such as *Generalize* and *Reflect and Connect*.





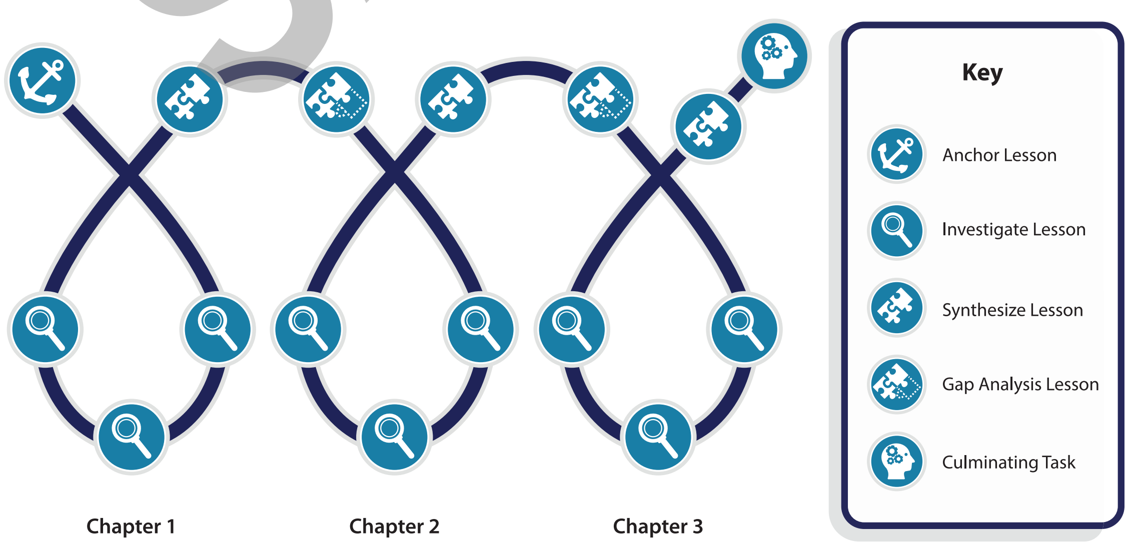






Initially, the routines that guide learning activities will feel new and different to you and your students. Over the course of several chapters and then several units, they will start to feel more natural and predictable, thus becoming more like "routines." Although this program suggests the sequence of routines to use in each lesson, the ultimate goal of having routines is to allow you to flexibly adapt instruction for your students' needs. Therefore, these routines will become tools for you to employ when you recognize that your students need them to support their learning.

Sequencing Lessons to Form Chapters and Units AIL lessons are sequenced to form chapters, which in turn are sequenced to form a unit. Below is a graphic that depicts how the different lessons are sequenced in a single chapter, or inquiry cycle, and how chapters are sequenced across a unit.



Every unit in this course begins with an Anchor Lesson and ends with a Culminating Task Lesson. Throughout the unit, students engage in multiple inquiry cycles (loops) consisting of Investigate Lessons. Synthesize Lessons and Gap Analysis Lessons are key moments in the instructional sequence when students recognize progress made and remaining limitations in understanding. Thus, Synthesize Lessons occur at the culmination of an inquiry cycle or chapter, while Gap Analysis Lessons coincide with the launch of a new chapter to re-engage students with a new aspect of the anchoring phenomenon or problem.

SOCIOSCIENTIFIC ISSUES

BSCS Biology: Understanding for Life is designed to provide students with the knowledge, abilities, and sense of agency to take positive action on behalf of themselves, their communities, and the natural world. To accomplish this, we must do more than the standards ask of us. In addition to providing students with learning experiences driven by their questions about phenomena, we must connect these phenomena to relevant socioscientific issues.

Socioscientific issues are complex problems at the intersection of science and society, such as the public health threat of antibiotic-resistant bacteria, and the challenge of providing a nutritious, sustainable food supply to Earth's growing population. The compelling social and ethical nature of these issues can contribute to students' motivation to investigate them, beyond their initial curiosity about the phenomenon. By connecting each unit's anchoring phenomenon to a socioscientific issue, referred to as a "societal issue," in *BSCS Biology,* we demonstrate their relevance to all students' lives as members of society, regardless of whether they choose to pursue science further in their studies or careers.

Developing and evaluating potential solutions to these societal issues require an understanding of the relevant science, but the solutions cannot be determined from science alone. Ethical, economic, historical, cultural, and other factors must be understood and weighed in light of the science (Herman et al. 2018). To facilitate meaningful engagement with socioscientific issues, students need to engage in activities that develop socioscientific reasoning practices. *BSCS Biology* draws from work by Sadler, Barab, and Scott (2007) to include these competencies and habits of mind necessary to grapple with complex issues:

- Recognizing the inherent complexity of socioscientific issues
- Understanding that socioscientific issues are subject to ongoing inquiry
- Analyzing socioscientific issues from multiple perspectives and appreciating the unique concerns of various stakeholders
- Exhibiting skepticism when obtaining information about socioscientific issues from potentially biased sources

For the development of *BSCS Biology,* we have created a framework for incorporating socioscientific reasoning practices into Anchored Inquiry Learning. In the Anchor Lesson for each unit, students encounter a puzzling phenomenon and are also asked to identify its connection to a societal issue. This connection and the motivation to address the societal issue are reinforced throughout each unit through targeted instructional moves and reflections. Lastly, we incorporate an *Understanding for Action* routine in Synthesize Lessons and the Culminating Task. In this routine, the class applies science ideas they have figured out to advance their understanding of the societal issue, to evaluate potential solutions, and to weigh their readiness to choose among actions to address the societal issue.