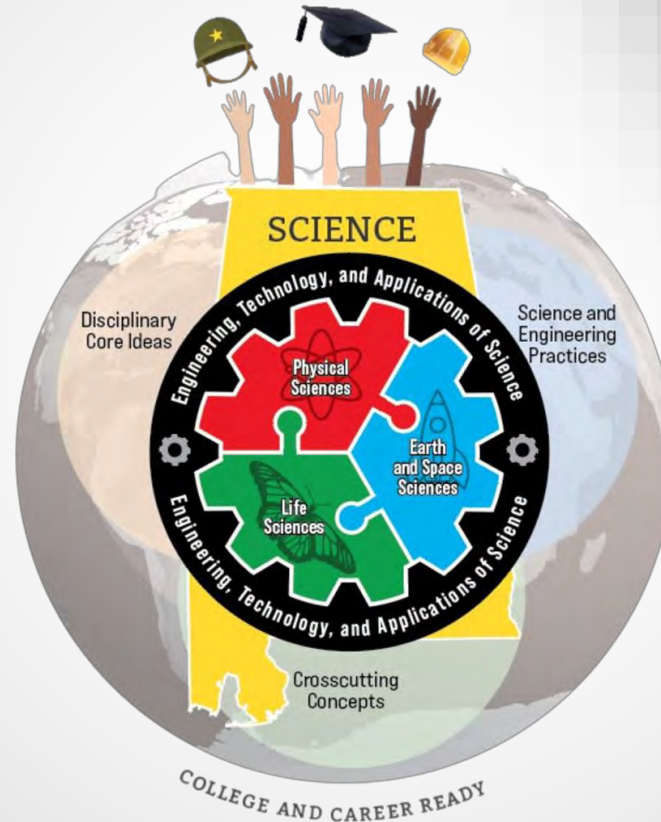


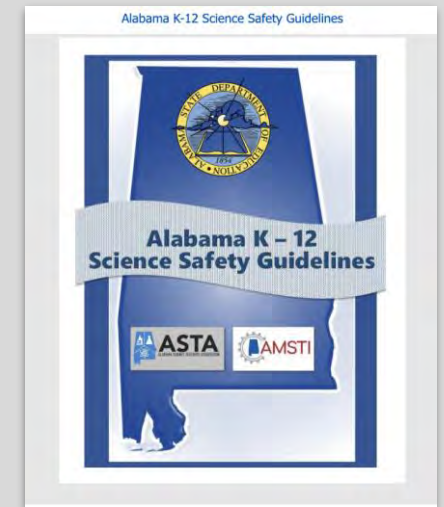
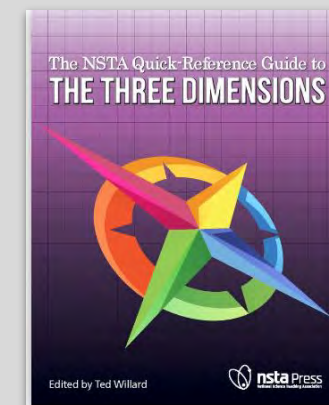
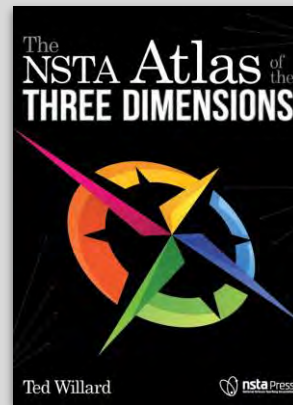
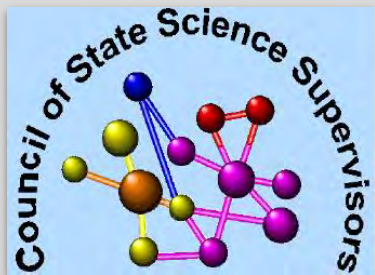
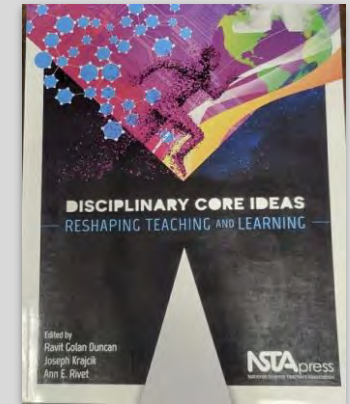
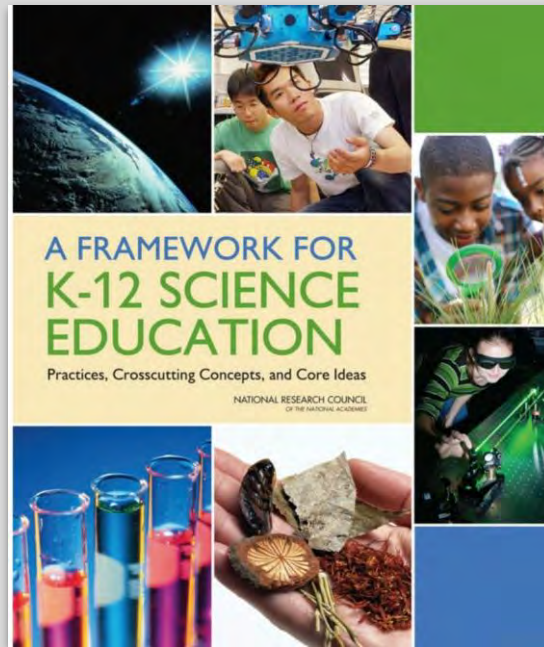
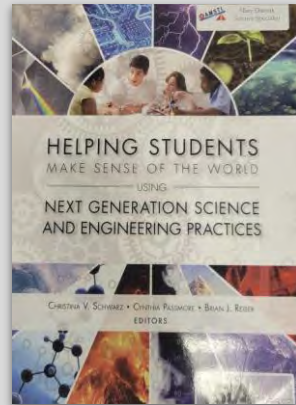
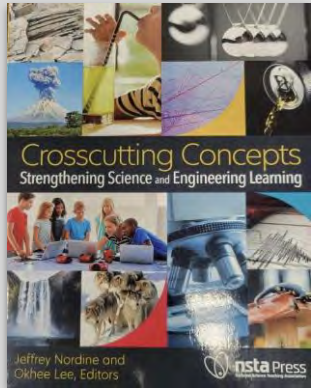
2023 Alabama Course of Study: Science



**Alabama State Board of Education Work Session
November 9, 2023**



Research and Resources





Committee and Task Force

The 2023 *Alabama Course of Study: Science* was drafted by the Science Course of Study Committee and Task Force consisting of:

- Educators from kindergarten through college
- Education specialists
- Public school administrators
- Business and community leaders
- Teachers of special populations



Vision and Goals

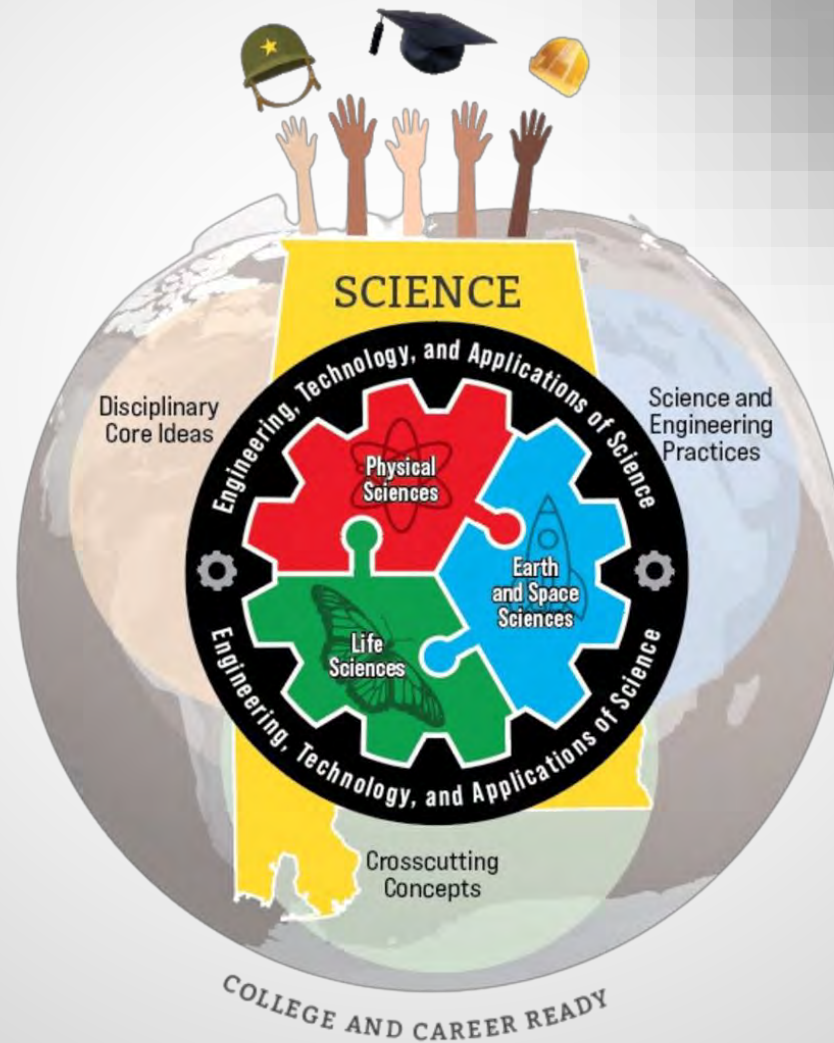
Alabama's K-12 science program emphasizes the importance of teaching science every day to every student in every grade. The committee and task force sought to accomplish this with the following goals:



- Provide foundational knowledge
- Demonstrate increasingly rigorous standards
- Develop scientifically literate citizens



Conceptual Framework



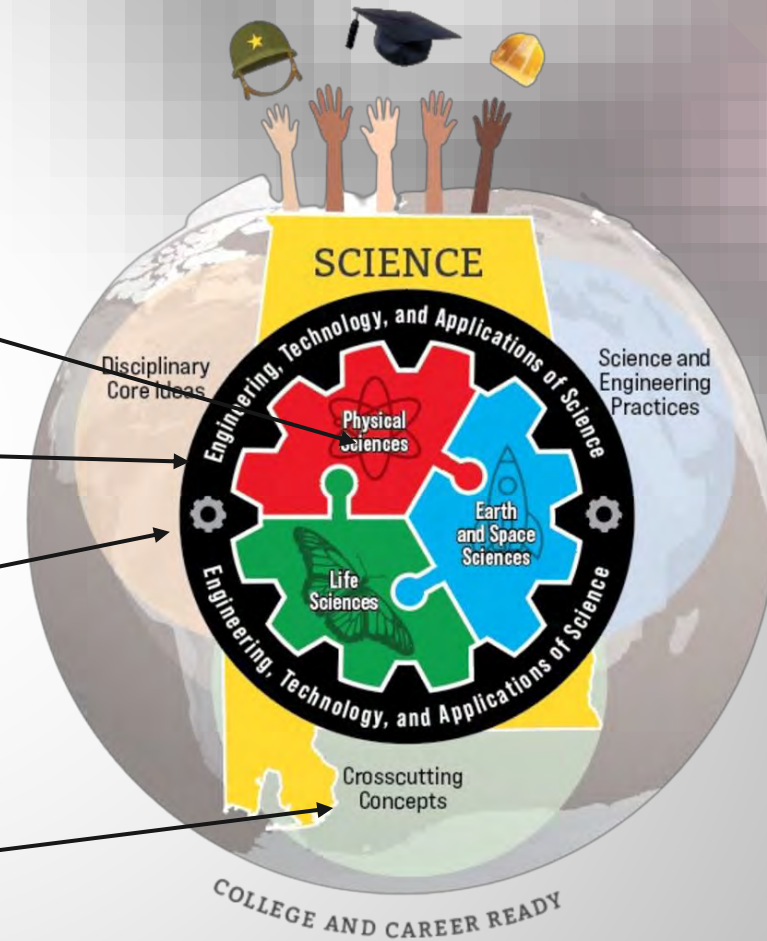
Conceptual Framework

- **Science Domains**

- **Core Ideas**

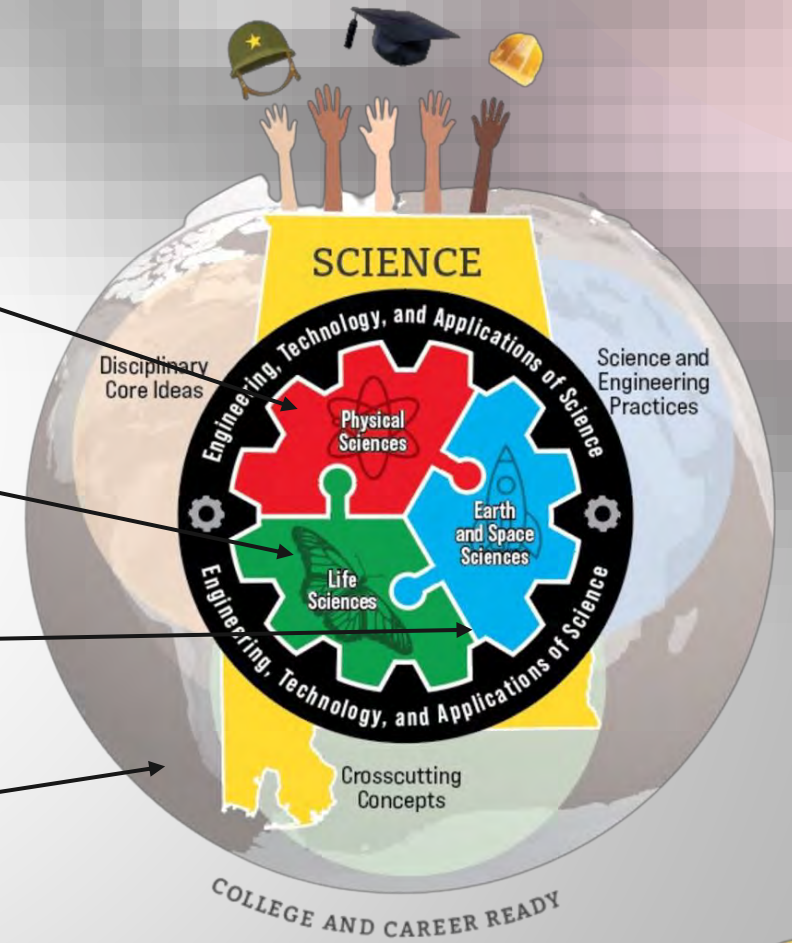
- **Engineering Gear Icon**

- **Dimensions of Science**



Conceptual Framework

- The domains are superimposed on the graphic of the state of Alabama.
- Each domain is represented by an image.
- Interconnectedness is represented by interlocking puzzle pieces.
- The background image of Earth represents a global perspective.



Structure of Standards: Three Scientific Dimensions

**Disciplinary Core Ideas
(Content)**

**Science and
Engineering
Practices
(Doing Science)**



**Crosscutting
Concepts
(Connecting
Science)**

Reading the Standards

Human Anatomy and Physiology, Standard 4

Disciplinary
Core Idea


Science and
Engineering Practices

Cross-Cutting
Concept

From Molecules to Organisms: Structures and Processes

Muscular
System

4

 Develop and build a three-dimensional model to illustrate the structure of the muscular system, including muscle locations, origins, and insertions, and explain their role in movement and support.

Example: Design and build a model of a lever to illustrate the relationship between bones and muscles and explain their roles in body movement and support.

Structure
and Function

Core
Content

Standard
Number

Engineering
Gear Graphic

Colors mirror those
in the National Framework




Changes in the Use of Including vs. Examples from 2015

In each grade, the committee differentiated between “including” and “examples.”

- “Including” indicates required content.
- Examples are used to clarify standards and may refer to ideas for instruction.

From Molecules to Organisms: Structures and Processes

Muscular System	4	 Develop and build a three-dimensional model to illustrate the structure of the muscular system, including muscle locations, origins, and insertions, and explain their role in movement and support. <i>Example: Design and build a model of a lever to illustrate the relationship between bones and muscles and explain their roles in body movement and support.</i>	Structure and Function
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Changes from 2015

- Gaps and overlaps were eliminated during vertical grade band committee meetings.
- Grade 6 Earth systems is now divided into two disciplinary core ideas.
- Distinctions were made between Grade 8 Physical Science and High School Physical Science, establishing a clear progression. There is also a distinction between High School Physical Science, Chemistry, and Physics.
- Content has been reorganized and clarification statements have been added.

From Molecules to Organisms: Structures and Processes

Photosynthesis and Respiration	5b	<p>Use models to explain the reactants and products involved in the conversion of light energy into stored chemical energy within cells during photosynthesis. <i>Examples: diagrams, flow charts, chemical equations, interactive games, or concept maps</i></p> <p>Clarification: Steps of light reactions or the Calvin cycle, or chemical structures of molecules are not required.</p>	Energy and Matter
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Developmentally Appropriate Content

Grades K-2 students



- Use senses to understand science
- Are natural scientists
- Are curious and eager to learn

Grades 3-5 students



- Develop reasoning
- Ask sophisticated questions
- Revise and extend understanding

Developmentally Appropriate Content

Grades 6-8 students

- Develop independent critical-thinking skills
- Shift from concrete to conceptual thinking
- Grow intellectually and probe more deeply



Grades 9-12 students

- Shift to subatomic and subcellular explanations
- Engage in complex scientific and engineering practices
- Develop as active, informed citizens



Learning Progressions

Physical Sciences, Motion and Stability: Forces and Interactions

K-2	3-5	6-8	9-12
<p><u>Kindergarten, Standard 1</u> Plan and carry out investigations to determine the effects of <u>forces</u> of different strengths and directions on the motion of an object, including speed, direction, and distance traveled.</p> <p><i>Examples: pushing, pulling, or colliding objects</i></p>	<p><u>Grade 3, Standard 1</u> Conduct investigations to explain the effects of balanced and unbalanced <u>forces</u> exerted on an object, varying the size, number, and direction of the forces.</p> <p><i>Examples: balanced forces pushing from both sides on an object, such as a box, producing no motion; unbalanced force on one side of an object, such as a ball, producing motion</i></p>	<p><u>Grade 8, Standard 11</u> Use models to demonstrate each of Newton’s laws of motion and explain the effects of <u>net forces</u> on objects.</p> <p><i>Examples: a model car on a table remains at rest until pushed, and a marble rolls across the floor until friction causes it to stop (first law of inertia)...</i></p>	<p><u>Physics, Standard 2</u> Construct explanations of dynamics from evidence, using Newton’s laws of motion.</p> <p>2a. Evaluate the effects of balanced and unbalanced <u>forces</u> on an object’s motion.</p>



Learning Progressions

Life Sciences: Ecosystems, Energy and Dynamics

K-2	3-5	6-8	9-12
<p><u>Kindergarten, Standard 3</u> Use data from observations to distinguish characteristics of living and nonliving things.</p>	<p><u>Grade 5, Standard 9</u> Create and use a model to explain the transfer of matter and energy between the environment and organisms within it.</p>	<p><u>Grade 7, Standard 5</u> Construct an explanation of how the cycling of matter between abiotic and biotic parts of ecosystems demonstrates the flow of energy and the conservation of matter, including the carbon, nitrogen, and water cycles.</p>	<p><u>Biology, Standard 7</u> Develop and use models to illustrate the flow of matter and energy between abiotic and biotic factors in ecosystems, including loss of heat, 10% rule, and the conservation of matter.</p>



Learning Progressions

Earth and Space Science: Earth's Place in the Universe

K-2	3-5	6-8	9-12
<p><u>Grade 1, Standard 8</u> Observe, describe, and predict patterns of the sun, moon, and stars as they appear in the sky.</p>	<p><u>Grade 5, Standard 10</u> Obtain and communicate information to explain why the sun appears to be larger and brighter than other stars.</p>	<p><u>Grade 6, Standard 1</u> Manipulate models to demonstrate the patterns of motion of the sun, Earth, and moon.</p> <p><u>1a.</u> Construct an evidence-based explanation of how the relative positions of the sun and Earth result in observable phenomena, including day and night cycles, length of year, and seasons.</p>	<p><u>Earth and Space Science, Standard 2</u> Obtain, evaluate, and communicate information about the structure and motion of components of the universe and solar system.</p>



Vision and Goals

Alabama's K-12 science program emphasizes the importance of teaching science **EVERY** day to **EVERY** student in **EVERY** grade.



Any Questions?

