South Brunswick School District

Curriculum Maps

K-12

District Mission
The South Brunswick School District will prepare students to be lifelong learners, critical thinkers, effective communicators and wise decision makers. This will be accomplished through the use of the New Jersey Core Curriculum Content Standards (NJCCCS) and/or the Common Core State Standards (CCSS) at all grade levels. The schools will maintain an environment that promotes intellectual challenge, creativity, social and emotional growth and the healthy physical development of each student.

~Adopted 8.22.11

Board Approval of Science Curriculum
August 2011

This curriculum is approved for all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy.
K-12 Curriculum Maps:  

Development of science concepts over time

Through funding provided by CONNECT-ED, curriculum developers in South Brunswick have mapped the concepts that are studied as part of the K-12 science curriculum. Their work was informed by that done by the American Association for the Advancement of Science (AAAS) in its development of the Atlas of Science Literacy.

To provide context, the Atlas of Science Literacy is a compendium of conceptual maps based on science strands. The maps show how students’ understanding of the ideas and skills leads to literacy in science, mathematics, and technology— and shows how this development occurs over time, from kindergarten through 12th grade. The Atlas may be accessed at the AAAS homepage: www.project2061.org

Included in the SBSD Compendium of Science Maps are the South Brunswick School District maps of the science learning that takes place across the K-12 grade levels. There are four maps—each based on the New Jersey Core Curriculum Content Standards.

- Science Processes
- Earth Science
- Life Science
- Physical Science

Each map focuses on a core topic and then displays the K-12 benchmarks that are most relevant to understanding it. The map illustrates the benchmarks along the way—each building upon that which comes below and supporting that which comes after.

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1 Established in 2003, CONNECT-ED is a Consortium of 14 central NJ districts/ independent schools, Rider and Princeton Universities, Raritan Valley Community College, Bristol-Myers Squibb Company, and the National Staff Development Council (NSDC) dedicated to providing a coherent, sustained system of professional development for K-12 teachers of science and math that models the inquiry approach to teaching/learning. organizes content around the Big Ideas in science and math, and makes concept connections across grade levels and among disciplines. South Brunswick is one of the fourteen districts involved, and has been a group member since the consortium’s inception.
Due to various forces, Earth is a part of an interconnected system with other objects in the universe that influence each other.

Earth is constantly changing as a result of its natural processes. Earth’s unique structure allows life to be possible.

Earth’s weather and climate systems are the result of complex interactions between land, ocean, ice and atmosphere.

How do gravity and nuclear forces affect the structure, motion and evolution of celestial bodies? What scientific tools and processes are used to determine the number of stars in our universe? How do new technology and the evidence it generates contribute to our current understanding of the evolution of the universe?

How do human activities affect climate change, ozone levels, and water pollution? What are the effects of changes in climate, ozone levels, air and water quality on human life? How does the transfer of thermal radiation influence weather conditions and/or patterns?

Is all life on Earth affected by the Sun and the moon? Could life exist on another planet? Why is it necessary for people to study astronomy? Did stars enhance civilizations?

What roles do the hydrologic cycle and ocean current patterns play in creating weather conditions? How do interactions of various weather variables contribute to the formation of weather conditions in a given time and area? What are the causes of Earth’s catastrophic weather? How can the climate of a region change over a period of time?

To what extent are the properties of objects in our solar system predictable? What causes patterns in the universe? What are some properties of the Sun, Moon, and the stars?

What is the Earth made of? What do the rocks and soil around us look like? Why are rocks and minerals important resources? What is a fossil?

How long does change take (human vs. geologic time scale)? What can rocks tell us about the history of the Earth? How do different types of maps help us understand the Earth? What are the challenges in obtaining and utilizing renewable resources as opposed to non-renewable resources?

How is the world handling the demand for alternate energy? How does the transfer of thermal radiation influence weather conditions and/or patterns?

What is the Earth made of? What are the properties of water? Where is water found?

What are the causes of Earth’s catastrophic weather? How can the climate of a region change over a period of time? How do changes in one part of an Earth system affect other parts of the system?

How are weather patterns observed, recorded, and interpreted? How does weather affect our daily lives? How does a drop of water travel through the water cycle? Why is water important?
Living organisms are all composed of cells that carry out biological functions.

To build cells, energy, which is provided by food, is required.

All animals and plants depend on each other and the environment to meet their basic needs.
Organisms go through life cycles which includes growth, development and reproduction.

High School
What are the steps on the life cycle of a cell? Which type of reproduction fosters biodiversity? What are the main types of asexual reproduction? What is the relationship between DNA, genes, chromosomes and cell division? How can DNA form be used to interpret the stage of cellular division? What are the main types of asexual reproduction? What is the relationship between DNA, genes, chromosomes and cell division? How can DNA form be used to interpret the stage of cellular division?

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High School
How do environmental conditions affect population numbers within an environment? What are the key components of Darwin’s theory of evolution? What are four different types of scientific evidence that are used to show evolution? What type of population would be significantly influenced by natural selection? What are the differences between artificial and natural selection? How would you estimate how closely related two organisms are?

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In all branches of science, there exist dynamic systems; and in each, a change in one component affects the entire system.
Interactions among matter can be described from an energy perspective, and mass/energy, coming in many forms, is always conserved.

Why does it appear to the observer that mass/energy are NOT conserved in chemical/nuclear reactions?
When is work done?
When is mech. energy conserved? When is it not?
How can energy be transferred without a transfer of matter?
What is the nature of light?
Why is it that a cyclical process can never be 100% efficient?
What is heat?

How does the law of conservation of matter apply to the physical and chemical changes of matter? (7th & 8th grade)
How does the transfer of thermal radiation influence weather condition and/or patterns? (7th & 8th grade)
How can the law of conservation of energy be applied? (7th & 8th grade)
How does the law of conservation of energy explain energy transfer and changes of energy state? (7th & 8th grade)

What is light? (2nd grade)
What are the sources of light? (2nd grade)
How does light travel? (2nd grade)
How do we know that things have energy? (4th grade)
How does light travel and behave? (4th grade)

No matter the nature of the forces, we need a net force to cause a change in motion.

What accelerates?
What causes an object to accelerate?
What are the consequences of being in equilibrium? Of not being in equilibrium?
Which interaction require contact, and which do not?
How can we test the existence of a field?

Does an object at rest have as much energy as an object in motion? (6th grade)
Is all life on Earth affected by the Sun and moon? (6th grade)
Why is everything in the universe in motion? (7th & 8th grade)
Why are Newton's laws of motion important in describing all motion in the universe and on Earth? (7th & 8th grade)

What evidence do we have of forces that we cannot see? (1st grade)
How do things move? (1st grade)
How can we change the way things move? (1st grade)
How do magnets work? (1st grade)

Forces come in equal and opposite pairs.

How do we identify an action/reaction pair?

Why are Newton's laws of motion important in describing all motion in the universe and on Earth? (7th & 8th grade)
Atoms are the basic building blocks of matter and determine interactions among matter at the microscopic level.

What is matter? (7th & 8th grade)
Why is it important to classify matter? (7th & 8th grade)
What role does heat energy play in the arrangement of matter? (7th & 8th grade)

How do gases behave? How do various conditions change the characteristics of gases?
How do certain factors affect the rate of a reaction and how do changes affect reversible reactions?
What are the driving forces of a reaction, and how do atoms rearrange to form new substances?
What are the physical/chemical properties associated with this change?
What role does heat energy play in the arrangement of matter?
How do acids, bases and salts behave?

How does an understanding of electrical phenomena impact and inform our everyday lives?
What is inside the atom? How are the electrons arranged?
What are some common properties of the elements?
How are molecules held together?
What causes molecular motion and how is it measured?

In all branches of science, there exist dynamic systems; and in each, a change in one component affects the entire system.

How do gases behave? How do various conditions change the characteristics of gases?
How do certain factors affect the rate of reaction?
How do changes affect reversible reactions?
How is the flow electric charge maintained?
How does one circuit component affect the function of others?
What are the connections between electricity and magnetism?

How does an electrical circuit work? (4th grade)
What happens if an element is removed from a circuit? (4th grade)

How do properties of materials determine their use and identification? (5th grade)
How might physical/chemical properties change after a chemical reaction? (5th grade)
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