

**West Essex Consortium Curriculum
Essex Fells, Fairfield, North Caldwell, Roseland
Science Department**

I. COURSE NAME: Science 4

II. COURSE PREREQUISITES: Science 3

III. GRADE LEVEL(S): 4

IV. COURSE DESCRIPTION:

The performance expectations in fourth grade help students formulate answers to questions such as: “What are waves and what are some things they can do? How can water, ice, wind and vegetation change the land? What patterns of Earth’s features can be determined with the use of maps? How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals? What is energy and how is it related to motion? How is energy transferred? How can energy be used to solve a problem? Fourth grade performance expectations include PS3, PS4, LS1, ESS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas from the NRC Framework. Students are able to use a model of waves to describe patterns of waves in terms of amplitude and wavelength, and that waves can cause objects to move. Students are expected to develop understanding of the effects of weathering or the rate of erosion by water, ice, wind, and vegetation. They apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of such processes on humans. In order to describe patterns of Earth’s features, students analyze and interpret data from maps. Fourth graders are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. Students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students are expected to develop an understanding that energy can be transferred from place to place by sound, light, heat, and electric currents or from object to object through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of patterns; cause and effect; energy and matter; systems and system models; interdependence of science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

V. COURSE OBJECTIVES:

In the fourth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

Prepared by:
Date of Revision:
BOE Approval:

VI. TEXTS/RESOURCES

- A. Textbook
- B. www.NSTA.org
- C. www.nextgenscience.org
- D. Achieve3000
- E. Newsela
- F. Readworks
- G. www.betterlesson.com

VII. EVALUATIONS/ASSESSMENTS

Students can demonstrate competency with tasks such as developing and refining models; generating, discussing and analyzing data; constructing spoken and written scientific explanations; engaging in evidence-based argumentation; and reflecting on their own understanding. A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

VIII. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

Alternate Curriculum map

1. <http://www.fortsmithschools.org/Portals/20/Content/Science%202016-17/Fourth%20Grade/Fourth%20Grade%20Year%20at%20a%20Glance.pdf>
2. State Map
<http://www.nj.gov/education/modelcurriculum/sci/4.shtml>
3. <http://www.livebinders.com/play/play?id=948826>

Prepared by:
Date of Revision:
BOE Approval:

Scope and Sequence of Content and Skills for Science 4

Unit Name	Earth's Place in the Universe
Estimated Timeline	September-October
Essential Questions (obtain from learning objectives)	<ul style="list-style-type: none"> • What can fossils tell us about history? • How do wind, water, and ice shape the land? • What is the difference between weathering and erosion? • How do fossils form? • What evidence of erosion can you see around you? • How can maps be used to describe patterns in our landforms? • What is a natural resource? • How are renewable resources different from non-renewable resources? • What resources do humans use from the earth? What impact does using these resources have on our environment? • How do humans survive Earth's natural events?
NGSS	4-ESS1-1 4-ESS2-1 4-ESS2-2 4-ESS3-1 4-ESS3-2
Student Learning Objectives standards	<ul style="list-style-type: none"> • Students will identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. • Students will make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. • Students will analyze and interpret data from maps to describe patterns of Earth's features. • Students will obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. • Students will generate and compare multiple solutions to reduce the impact of natural Earth processes on humans.
Suggested projects, activities, labs used to support content	<ul style="list-style-type: none"> • Students will examine samples of fossils, as well as photographs of rock layers, and write a story about how the landforms have changed over time, and what the landscapes may have been like many years ago.

Prepared by:
 Date of Revision:
 BOE Approval:

with applicable resource links

- Students will create fossils using plastic insects and clay - molding the clay with various amounts of weight. Determine the minimum amount of weight needed to create the ideal fossil impression. Discuss the relationship between the weight applied and the layers of sedimentary rock in the earth.
- Students will create models of landforms and simulate the effect of different forms of erosion, changing variables for each simulation. Wind, water, and ice will be used on the model landforms to determine the features and effects created. (use stream tables)
- Students will measure the effects of different forms of erosion from the models and draw conclusions based on the data.
<http://www.discoveryeducation.com/teachers/free-lesson-plans/the-grand-canyon.cfm>
- Students will watch a video comparing satellite views of the Earth over time.
- Students will examine maps of the Earth and it's features. Look for patterns and identify features and where they occur.
- Students will read articles about natural events and the impacts on communities. (focus on areas near bodies of water for most impact)
- Students will create an emergency preparedness kit for handling the impact of natural events/disasters
- Save our City -
https://www.teachengineering.org/activities/view/cub_natdis_lesson01_activity1 natural disaster prevention
- Students will create/build building models that can withstand an earthquake
https://www.teachengineering.org/activities/view/cub_natdis_lesson03_activity1 (Earthquake proof building)
- Students will build "house of cards" that will remains sturdy when placed under pressure for period of time. (engineering challenge)
- Students will build sand castles with combinations of types of sand and glue and design an experiment to determine how well they hold up to weathering.
https://www.teachengineering.org/activities/view/cub_earth_lesson1_activity1 (three little pigs sand houses)
- Students will read/research the grand canyon and discuss impacts over time
<http://www.discoveryeducation.com/teachers/free-lesson-plans/the-grand-canyon.cfm> (examining the grand canyon)
- Students will identify natural hazards in a fictional country and make decisions on where to place scientific devices to help prevent disaster
https://www.teachengineering.org/activities/view/cub_natdis_lesson01_activity1
- Birth of rocks 4 week unit of study
<https://mysteryscience.com/rocks/rock-cycle-erosion-natural-hazards>
- Oil spill activity - human impact of natural resources
<https://www.calacademy.org/educators/lesson-plans/slippery-shores-oil-spill-clean-up>

Prepared by:
Date of Revision:
BOE Approval:

	<ul style="list-style-type: none"> ● Carving out the landscape, http://teachers.egfi-k12.org/road-warriors/ ● ● ● Rocks and minerals http://www.livebinders.com/play/play?id=759827
Suggested assessments	<p>Students can demonstrate competency with tasks such as:</p> <ul style="list-style-type: none"> ● Designing, building and refining models ● Generating, discussing and analyzing data ● Constructing spoken and written scientific explanations ● Writing arguments to support scientific evidence ● Reflecting on their own understanding ● Notebook entries ● Response sheets ● Focus question answers ● Science and engineering practices checklist
Additional Suggested resources	<ul style="list-style-type: none"> ● http://www.earthsciweek.org/classroom-activities/ngss (general resource) ● ●

Prepared by:
Date of Revision:
BOE Approval:

Unit Name	Energy
Estimated Timeline	November-January
Essential Questions	<ul style="list-style-type: none"> • What is energy? • How is energy transferred between objects? • What are some examples of energy around you? • How can energy be converted from one form to another? •
NGSS	4-PS3-1 4-PS3-2 4-PS3-3 4-PS3-4
Student Learning Objectives	<ul style="list-style-type: none"> • Students will use evidence to construct an explanation relating the speed of an object to the energy in that object. • Students will make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. • Students will ask questions and predict outcomes about the changes in energy that occur when objects collide. • Students will apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Suggested projects, activities, resources, labs used to support content	<ul style="list-style-type: none"> • Students will design an experiment to test the energy in a moving object by measuring and evaluating the impact the moving object has on a second, stationary object. • Students will build spool racers that will transfer stored energy in a rubber band to kinetic energy in the moving spool racer. Students will write a reflection relating the speed of the racer (measured) to the amount of energy in the rubber band. https://www.teachengineering.org/activities/view/ucd_energy_lesson01_activity1 (spool racer design challenge) • Students will be provided materials to build model circuits converting energy in a battery into light. • Students will convert solar energy to produce workable oven https://www.homesciencetools.com/a/build-a-solar-oven-project/ • Students will explore the amount of energy needed to bounce various types of balls at different heights(golf ball and ping pong ball activity, see attached 5e model lesson plan • Students will demonstrate the transfer of energy from colored paper to an ice cube. See attached 5e model lesson plan • Students will explore principles of energy related to electricity.

Prepared by:
Date of Revision:
BOE Approval:

	<p>https://educators.brainpop.com/lesson-plan/electricity-lesson-plan-exploring-currents-circuits-electromagnetism/</p> <ul style="list-style-type: none"> ● How does height affect the distance a car travels: http://teachertech.rice.edu/Participants/louviere/Newton/hotwheels.html ● Students will examine the differences between sound energy in solids, liquids, and gases https://www.teachengineering.org/activities/view/cub_energy2_lesson05_activity2 ● Students will design and test gliders to obtain the maximum amount of distance. Students will modify and redesign to gain 10% distance over original design. (see Pearson, Interactive Science) ● Penny experiment. Penny Experiment
Suggested assessments	<p>Students can demonstrate competency with tasks such as:</p> <ul style="list-style-type: none"> ● Designing, building and refining models ● Generating, discussing and analyzing data ● Constructing spoken and written scientific explanations ● Writing arguments to support scientific evidence ● Reflecting on their own understanding ● Notebook entries ● Response sheets ● Focus question answers ● Science and engineering practices checklist

Prepared by:
Date of Revision:
BOE Approval:

Prepared by:
Date of Revision:
BOE Approval:

Unit Name	Waves and their Applications
Estimated Timeline	February-March
Essential Questions	<ul style="list-style-type: none"> • What are waves? • How can you describe the patterns in waves? • What are the parts of a wave? • How can waves affect the motion of an object? • How does light (and changing light) impact the ability of objects to be seen? • What is reflection/refraction? How do they affect how we see things? • How do our eyes see objects?
NGSS	4-PS4-1 4-PS4-2 4-PS4-3
Student Learning Objectives	<ul style="list-style-type: none"> • Students will develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. • Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. • Generate and compare multiple solutions that use patterns to transfer information.
Suggested projects, activities, labs used to support content	<ul style="list-style-type: none"> • Students will model waves in water and describe the origin of the wave and the effect of the wave https://www.eduplace.com/rdg/gen_act/ocean/wave.html • Students will demonstrate how force changes a waves amplitude and its ability to move an object. https://api.betterlesson.com/mtp/lesson/636706/print • Students will apply their knowledge of waves (sound, light) to communicate through non verbal means https://api.betterlesson.com/mtp/lesson/630476/print • Students will build/examine a model of the human eye and describe how light is responsible to seeing objects. • Waves unit: https://learning-in-action.williams.edu/opportunities/elementary-outr each/science-lessons/4th-grade-waves-unit/ • Unit lessons: http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=16 • Model waves in 2 liter bottles with a cork inside and examine what happens to the cork https://api.betterlesson.com/mtp/lesson/636706/print •

Prepared by:
Date of Revision:
BOE Approval:

<p>Suggested assessments</p>	<p>Students can demonstrate competency with tasks such as:</p> <ul style="list-style-type: none"> ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
<p>Additional Suggested resources</p>	<ul style="list-style-type: none"> ● Betterlesson.com

Prepared by:
Date of Revision:
BOE Approval:

Unit Name	From Molecules to Organisms: Structures and Processes
Estimated Timeline	April-June
Essential Questions	<ul style="list-style-type: none"> ● What do plants and animals need to survive? ● How do internal and external structures support life? ● What is a system? ● How do these structures/systems work together? ● Why do living things need to sense? ● What do living things sense? ● How does sensory information guide actions of a living thing? ● What are sense receptors?
NGSS	4-LS-1 4-LS-2
Student Learning Objectives	<ul style="list-style-type: none"> ● Students will construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. ● Students will use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in a different way.
Suggested projects, activities, labs used to support content	<ul style="list-style-type: none"> ● Students will identify structures useful to animals and describe their functions in survival ● Create diagram of plant structures ● Students will identify structures useful to plants and describe their functions in survival ● Students will watch brain pop videos on various human body systems and play guts and bolts to connect the systems so that they function in a working order. ● Students will make a model lung and describe its function in the body and how it assists in a larger system needed for survival ● Students will examine camouflage through an activity designed to hide worm from a “bird” based on their color ● . Students will use information they know and have learned about bones to apply to an unknown creature by assembling the bone structure and making inferences https://api.betterlesson.com/mtp/lesson/631974/print ● Students will use their sense of touch only, to describe unknown objects https://api.betterlesson.com/mtp/lesson/615769/print ● “Dissect a Lima Bean” activity: http://buggyandbuddy.com/dissect-a-bean-seed-science-invitation-saturday/

Prepared by:
Date of Revision:
BOE Approval:

	<ul style="list-style-type: none"> • Use this bird beak adaptation activity to have students examine how easily different shaped beaks pick up food for birds. This is a 7th grade activity, adapt to 4th grade http://www.vrml.k12.la.us/7th/7SC_By_Unit/unit5/act1/7SC_Un5Act1.htm • vity&pc=cosp&ptag=C1A68A4E9EB38&form=CONMHP&conlogo=CT3210127&adlt=strict
<p>Suggested assessments</p>	<p>Students can demonstrate competency with tasks such as:</p> <ul style="list-style-type: none"> • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
<p>Additional Suggested resources</p>	<ul style="list-style-type: none"> •

Prepared by:
Date of Revision:
BOE Approval: