Alignment of Oregon Science Standards

Crosswalk of 2009 Oregon Science Standards to
2014 Oregon Science Standards (Next Generation Science Standards)

OREGON DEPARTMENT OF EDUCATION

Alignment of Oregon Science Standards

2014 Science Standards (Next Generation Science Standards) and 2009 Science Standards

Introduction

These pages show how the content, practices, and cross-cutting concepts (CCC) associated with the new Oregon Science Standards (NGSS) adopted in March 2014 align to the Oregon Science Standards adopted in February 2009. It is important to remember that the new Oregon Science Standards (NGSS) will be phased in so that districts can implement changes in local curriculum, provide appropriate professional development for teachers and administrators, and provide students with opportunities to learn the content, practices, and cross-cutting concepts prior to assessment. Oregon students will continue to be assessed on the Oregon 2009 Science Content Standards via OAKS Science until a new science assessment that aligns with the newly adopted standards is developed and becomes operational in 2018-2019.

Purpose

The purpose of this document is to provide educators with a view of the alignment between the 2009 content standards currently required as part of each Oregon district's curriculum and instruction in the subject area of science, and those contained in the new 2014 Oregon Science Standards (NGSS). An examination of the content of these pages is meant to provide at least some clarification on the following issues:

- What content, practices, and cross-cutting concepts are new and have not previously been a part of Oregon's 2009 Science Standards?
- What content, practices, and cross-cutting concepts will now need to be part of the curriculum at an earlier (or later) grade level than where they are currently taught and assessed?
- In what instances are similar skills being addressed, but with a somewhat different emphasis or with different expectations regarding the degree of sophistication?

Organization of the Alignment Tables

The rows in the table show whether there is a corresponding 2009 Oregon science standard(s) for each of the new 2014 Oregon science standards (NGSS) performance expectation (PE) in the areas of content, practices, and cross-cutting concepts (CCC). Codes designate the degree of alignment: S = Strong; P = Partial; D = Different Grade; N = New (not in any 2009 ORSS). The 2009 Oregon Science Standards that are not aligned to any new 2014 Oregon Science Standard (NGSS) are included at the end of the document. The bulleted statements at the beginning of the document provide summary information about the differences between the two sets of standards.

Alignment of Oregon's 2014 Science Standards (NGSS) with 2009 Oregon Science Standards (2009 ORSS)

Degree of Alignment Codes: **S** = Strong; **P** = Partial; **D** = Different Grade; **N** = New (not in any 2009 ORSS)
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Grade: High School Physical Science

- Waves were added at the strand level. At the disciplinary core level, the following topics are new or expanded: Electricity and Magnetism, Heat Transfer/Thermodynamics, Nuclear, and Momentum.
- NGSS places additional emphasis on mathematical relationships and computational models.
- In the NGSS, students must be able to construct, revise, and use scientific models to predict results and communicate information.
- Although Scientific Inquiry is not explicitly referenced, it is integrated throughout the NGSS.

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-PS1 Matter and its Interactions					
HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	H.1P.1	S	N	N	NGSS implies Atomic Structure. Using the Periodic Table as a model is new.
HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	H.2P.1 H.3S.1 H.3S.2 H.3S.3	P	 P P P	N	NGSS explicitly includes revision of an explanation. NGSS encourages other types of data sources beyond student generated.
HS-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	H.1P.2 H.3S.2 H1	S	 S	 S	2009 ORSS use "bonds"; NGSS uses the term "forces".
HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.	H.2P.1 H.2P.3	S	N	 S	Develop a model is a new practice. The combination of H.2P.1 & H.2P.3 makes a strong CCC alignment.
HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	H.2P.1 H.3S.3	S	 S	 P	CCC is only aligned when drawing a conclusion and examining the pattern from data.
HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.	 H.4D.2-4 H2	N	 S	 P	NGSS goes beyond 2009 ORSS by specifying a modification to the design. Strong alignment with all engineering design 2009 ORSS.
HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	H.2P.2	S	N	P	Supports Common Core math and Oregon Essential Skills to use mathematics in context.

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NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-PS1-8. Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.	H.1P.1 H.2P.2 H.2P.3	P P P	N	P	Develop a model is a new practice. See NGSS Volume 1 for clarification for the Disciplinary Core Idea in the NGSS to find link to conservation of mass.
HS-PS2 Motion and Stability: Forces and Interactions					
HS-PS2-1. Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	H.2P.4 H.3S.3 H2	S	S	S	NGSS emphasis is strong on the mathematical relationship which is a Common Core connection.
HS-PS2-2. Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	H.2P.4	P	N	N	Supports Common Core math, and Oregon Essential Skills to use mathematics in context. "Momentum" is new content, while "net force" is connected to 2009 ORSS.
HS-PS2-3. Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	H.2P.4 H.4D.2-4	S	S	S	
HS-PS2-4. Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	H.2P.4	P	N	N	Supports CCSSM, and Oregon Essential Skills to use mathematics in context. Coulomb's Law and Electrostatic Forces are new concepts.
HS-PS2-5. Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	H.3S.2 H2	N	S	S	The foundation for this content is 2009 ORSS 6.2P.2.
HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	H.1P.2 H3 H1+H3	P	P	S	NGSS is more focused on communication and includes a variety of formats that students can communicate their findings.
HS-PS3 Energy					
HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	H.2P.3 H2	P	N	P	Supports Common Core math, and Oregon Essential Skills to use mathematics in context. Develop a model is a new practice.

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NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).	H.2P.3 H2	P	N	S	Develop a model is a new practice. NGSS specifies "energy transformation", where the 2009 ORSS is more general.
HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	H.2P.3 H.4D.2-4 H.4D.6	S	S	S	There are two CCC for this performance expectation.
HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	H.3S.2 H2	N	S	S	
HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	H2	N	N	P	Develop a model is a new practice.
HS-PS4 Waves and their Applications in Technologies for Information Transfer					
HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.		N	N		Supports Common Core math, and Oregon Essential Skills to use mathematics in context.
HS-PS4-2. Evaluate questions about the advantages of using a digital transmission and storage of information.	H.3S.5 H.4D.5	N	P P	N	
HS-PS4-3. Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	H.3S.4	N	P	N	
HS-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	H.3S.3 H.4D.4 H2	N	P P	P	

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HS-PS4-5. Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	 H4.D5 H4.D6 H3+H4 H4	N	 P P P	 S S P	NGSS includes a variety of formats that students can use to communicate their findings.
HS-ETS1 Engineering Design					
HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	H.4D.1 H.4D.3	S P/N	P/N P/N	P P	NGSS is more contextualized, rigorous, and includes global perspective.
HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	H.4D.2 H.4D.4 H.4D.6	P P P	P P P		Combination of these three 2009 ORSS provides a strong alignment.
HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	H.4D.1 H.4D.3 H.4D.4 H.4D.5 H.4D.6	P P S P S	P N S P S	P P S P P	Combination of these three 2009 ORSS provides a strong alignment.
HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	H.4D.1 H.4D.3 H.4D.4	P P P	N N N	P P P	2009 ORSS are loosely tied to modeling but not explicitly stated.
2009 ORSS not aligned to any NGSS:					
H.3.S.5. Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies.					
H.4.D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.					
H.4.D.6 Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment.					

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Grade: High School Life Science

- A road map for integration between content and practice can be found on page 261 of the NGSS book.
- The boundaries of each NGSS PE provide guidance to adequately teach the depth and breadth of each standard.
- Models are not limited to physical models, but can also include illustrations, mathematical representations, simulations, etc.
- Asking questions can refer to a way of obtaining, evaluating, and communicating information (students' show their thinking process) as a means of deriving a response.
- Applying concepts of statistics and probability is a skill that can be utilized in numerous standards, not just those standards where explicitly stated.

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-LS1 From Molecules to Organisms: Structures and Processes					
HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	H.1.L.2 H.1.L.3 H.3.S.3	S P	 P	S S P	These 2009 ORSS combined cover this standard as long as the practices and CCC are included. CCC is structure and function.
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	5.1.L.1 6.1.L.1 6.2.L.1 H.1	P P P	N	N P	These 2009 ORSS combined result in a strong alignment. CCC is systems and system models.
HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	H.1.L.4 H.3.S.2	P	 S	N S	These 2009 ORSS combined result in a strong alignment. CCC is stability and change.
HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	H.1.L.4 H.2.L.3	P P	N	N	These 2009 ORSS combined result in a strong alignment. CCC is systems and system models.
HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	8.2.P.2 H.2.L.1	P P	N	N P	CCC is energy and matter.
HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	H.1.L.1 H.2.L.1 H.3.S.3	P P	 P	N P	CCC is energy and matter.
HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	H.1.L.1 H.1.P.2 H.2.P.1	P P P	N	N	CCC is energy and matter.

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NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-LS2 Ecosystems: Interactions, Energy, and Dynamics					
HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	6.2.L.2 H.2.L.2	P P	N	N	CCC is scale, proportion, and quantity.
HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	H.2.L.2 H.3.S.3	P	N P	N	CCC is scale, proportion, and quantity.
HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	H.2.L.1 H.1.L.4 H.3.S.3	P P	 P	N P	OR Standards are nearly identical to NGSS. NGSS includes the addition of aerobic/anaerobic conditions. CCC is energy and matter.
HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	H.2.L.1 H.2.P.3	P P	N	N	CCC is energy and matter.
HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	H.2.L.1 7.2.L.2	P P	N	N	CCC is systems and system models.
HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	H.2.L.2 H.2.E.4 H.3.S.3	P P	 P	P P	CCC is stability and change. The "reasoning" component of this standard is new.
HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	H.2.E.4 H.3 H.4.D.1-4	P	 P S	 S	CCC are stability and change and cause and effect. Biodiversity is a new component.
HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	 H.3.S.3	N	 P	N	CCC is cause and effect.

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NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-LS3 Heredity: Inheritance and Variation of Traits					
HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	H.1.L.2 H.1.L.3 H.3.S.1	P S	 P	P	CCC are cause and effect and structure and function.
HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	H.2.L.3 H.2.L.4 H.3.S.1 H.3.S.3	P P	 P P N	P	CCC is cause and effect. Engaging in argument from evidence is new.
HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	 H.1.L.3 H.3.S.3	N P	 P	N	CCC is scale, proportion, and quantity.
HS-LS4 Biological Evolution: Unity and Diversity					
HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	H.2.L.5 H.3.S.4	S P	N	N	CCC is patterns.
HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	H.2.L.4 H.2.L.3 H.3.S.3 H.1.L.4 H.2.L.2	P P P P	 P	N	CCC is cause and effect.
HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.		N	N	N	CCC is patterns. Practices of mathematics and computational thinking and argumentation from evidence are new.
HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	H.2.L.4 H.3.S.3 H.2.L.2	P P	 P	N	CCC is cause and effect.

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NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	H.2.L.2 H.2.L.4 H.3.S.3	P P	 P	N	CCC are cause and effect and stability and change. This standard offers a strong example of an opportunity to include H.3.S.4 as a historical background to the content.
HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	H.4.D.1-4	N	S	N	CCC is cause and effect.
HS-ETS1 Engineering Design					
HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	H.4D.1 H.4D.3	S P/N	P/N P/N	P P	NGSS is more contextualized, rigorous, and includes global perspective.
HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	H.4D.2 H.4D.4 H.4D.6	P P P	P P P		Combination of these three 2009 ORSS provides a strong alignment.
HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	H.4D.1 H.4D.3 H.4D.4 H.4D.5 H.4D.6	P P S P S	P N S P S	P P S P P	Combination of these three 2009 ORSS provides a strong alignment.
HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	H.4D.1 H.4D.3 H.4D.4	P P P	N N N	P P P	2009 ORSS are loosely tied to modeling but not explicitly stated.
2009 ORSS not aligned to any NGSS:					
H.3.S.5. Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies.					
H.4.D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.					
H.4.D.6 Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment.					

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Grade: High School Earth and Space Science

- The teaching and learning needs to be engaging hands-on with connections to employers and real world contexts.
- NGSS include more higher level expectations.
- Earth science is a life skill important to all students and their science literacy, citizenship, and connects science to student's own environmental well-being.

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-ESS1 Earth's Place in the Universe					
HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy in the form of radiation.	H.2E.3 H.1P.1 H.2P.3	P P S	N N N	N N N	
HS-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	H.2E.3 H.2P.3	P	N	N P	No explicit mention in the 2009 ORSS of Big Bang theory.
HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements.	H.1E.1 H.2E.3	P S	N S	N N	Content is strongly aligned when both 2009 ORSS are combined.
HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	H.2P.4	P	N	N	
HS-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	H.1E.2 H.2E.1 H.2E.2 H.3S.3	S S S	N N N	 S	NGSS is more specific than the 2009 ORSS. Evaluation of evidence is new.
HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.	H.3S.1 H.2E.2 H.2E.3 H.3S.4	S P P	N N N	 S	Earth's early history is new. Evaluation of evidence is new.
HS-ESS2 Earth's Systems					
HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	H.1E.2 H.2E.1 H.2E.2	P S S	N N P	 P	Develop a model is new.

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Grade: High School Earth and Space Science

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.	H.2E.1 H.2E.4 H.2L.2 H.3S.3 H.3S.5	S S S	N S N S	P	Feedback loops and stability are new. Cost benefit analysis is new.
HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	H.2E.1 H.2E.2 H.2P.3 H.4D.5	S S S	N N N	S P	Develop a model is new.
HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	H.2E.1 H.2E.2 H.2P.3 H.3S.3	S S S	N N N	S	Use a model is new.
HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	All H.3 H.1E.2 H.1P.2 H.2E.1-2 H.2E.4 H.2P.1 H.4D.6	P P P N	S N N N N N	P P	
HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	H.1E.2 H.2E.1 H.2L.1 H.2E.2 H.2P.2 H.2P.3	P S P P P P	N N N N	S S	
HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	H.2L.4 H.2L.5 H.2E.2-4 H.3S.1 H.3S.4 H.1L.4 H.2L.2 H.1L.3 H.2L.1	P P S P P P P	N N N N N N N N N	P P P P P P	This addresses both how the Earth system impacts biology and how biology impacts the Earth system.

Alignment of Oregon's 2014 Science Standards (NGSS) with 2009 Oregon Science Standards (2009 ORSS)

Degree of Alignment Codes: **S** = Strong; **P** = Partial; **D** = Different Grade; **N** = New (not in any 2009 ORSS)
2009 Oregon Science Standards that are not aligned to any New Oregon Science Standard (NGSS) are included at the end of the document.
The bulleted statements at the beginning of the document provide summary information about the differences between the two sets of standards..

Grade: High School Earth and Space Science

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-ESS3 Earth and Human Activity					
HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	H.2E.4 H.3S.3 H.1P.1 H.2L.2 H.4D.5	S P P 	P N N 	P S P P	2009 ORSS H.1P.1 nuclear energy to mitigate greenhouse gasses creates hazards.
HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	H.4D.4 H.4D.6 H.2E.4 H.2P.3	 S P	S N N N	S S 	2009 ORSS H.4D.6 doesn't explicitly address macro-economics.
HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	H.2L.2 H.2E.2 H.2E.4 H.4D.5	P P P 	N N N 	P P N P	Creating a computational simulation is new. STEM and CCSS math connection.
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	H.4D.4 H.4D.5 H.4D.6 H.2E.4 H.3S.5	 S 	S P N N 	P N N N P	
HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.	H.1E.2 H.2E.1-3 H.2E.4 H.3S.2	P P P 	N N N P	 P 	Use of models is new.
HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	H.2E.4 H.3S.2 H.4D.1	S 	N 	N P P	Use of computational representation is new.
HS-ETS1 Engineering Design					
HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	H.4D.1 H.4D.3	S P/N	P/N P/N	P P	NGSS is more contextualized, rigorous, and includes global perspective.
HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	H.4D.2 H.4D.4 H.4D.6	P P P	P P P		Combination of these three 2009 ORSS provides a strong alignment.

Alignment of Oregon's 2014 Science Standards (NGSS) with 2009 Oregon Science Standards (2009 ORSS)

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Grade: High School Earth and Space Science

NGSS PE	2009 ORSS	NGSS Content	NGSS Practice	NGSS CCC	Notes on Alignment
HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.	H.4D.1 H.4D.3 H.4D.4 H.4D.5 H.4D.6	P P S P S	P N S P S	P P S P P	Combination of these three 2009 ORSS provides a strong alignment.
HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.	H.4D.1 H.4D.3 H.4D.4	P P P	N N N	P P P	2009 ORSS are loosely tied to modeling but not explicitly stated.
2009 ORSS not aligned to any NGSS:					
H.3.S.5. Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies.					
H.4.D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.					
H.4.D.6 Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment.					