

PC-ODE Model Science 2 Curriculum – Topics and Content Statements*
Theme: Observations of the Environment

Earth and Space Science [ESS]

The Atmosphere

ESS 1: [1] The atmosphere is made up of air.

ESS 2: [2] Water is present in the air.

ESS 3: [3] Long- and short-term weather changes occur due to changes in energy.

Physical Science [PS]

Changes in Motion

PHS 4: [1] Forces change the motion of an object.

Life Science [LS]

Interactions within Habitats

LIS 5: [1] Living things cause changes on Earth.

LIS 6: [2] Some kinds of individuals that once lived on Earth have completely disappeared, although they were something like others that are alive today.

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PC-ODE Model Science 3 Curriculum – Topics and Content Statements*
Theme: Interconnections within Systems

Earth and Space Science [ESS]

Earth's Resources

ESS 1: [1] Earth's nonliving resources have specific properties.

ESS 2: [2] Earth's resources can be used for energy.

ESS 3: [3] Some of Earth's resources are limited.

Physical Science [PS]

Matter and Forms of Energy

PHS 4: [1] All objects and substances in the natural world are composed of matter.

PHS 5: [2] Matter exists in different states, each of which has different properties.

PHS 6: [3] Heat, electrical energy, light, sound and magnetic energy are forms of energy.

Life Science [LS]

Behavior, Growth, and Changes

LIS 7: [1] Offspring resemble their parents and each other.

LIS 8: [2] Individuals of the same kind differ in their traits and sometimes the differences give individuals an advantage in surviving and reproducing.

LIS 9: [3] Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

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PC-ODE Model Science 4 Curriculum – Topics and Content Statements*
Theme: Interconnections within Systems

Earth and Space Science [ESS]

Earth's Surface

ESS 1: [1] Earth's surface has specific characteristics and landforms that can be identified.

ESS 2: [2] The surface of Earth changes due to weathering.

ESS 3: [3] The surface of Earth changes due to erosion and deposition.

Physical Science [PS]

Electricity, Heat, and Matter

PHS 4: [1] The total amount of matter is conserved when it undergoes a change.

PHS 5: [2] Energy can be transformed from one form to another or can be transferred from one location to another.

Life Science [LS]

Earth's Living History

LIS 6: [1] Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

LIS 7: [2] Fossils can be compared to one another and to present day organisms according to their similarities and differences.

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PC-ODE Model Science 5 Curriculum – Topics and Content Statements*
Theme: Interconnections within Systems

Earth and Space Science [ESS]

Cycles and Patterns in the Solar System

ESS 1: [1] The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.

ESS 2: [2] The sun is one of many stars that exist in the universe.

ESS 3: [3] Most of the cycles and patterns of motion between the Earth and sun are predictable.

Physical Science [PS]

Light, Sound, and Motion

PHS 4: [1] The amount of change in movement of an object is based on the mass of the object and the amount of force exerted.

PHS 5: [2] Light and sound are forms of energy that behave in predictable ways.

Life Science [LS]

Interactions within Ecosystems

LIS 6: [1] Organisms perform a variety of roles in an ecosystem.

LIS 7: [2] All of the processes that take place within organisms require energy.

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PC-ODE Model Science 6 Curriculum – Topics and Content Statements*
Theme: Order and Organization

Earth and Space Science [ESS]

Rocks, Minerals and Soil

ESS 1: [1] Minerals have specific, quantifiable properties.

ESS 2: [2] Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.

ESS 3: [3] Igneous, metamorphic and sedimentary rocks form in different ways.

ESS 4: [4] Soil is unconsolidated material that contains nutrient matter and weathered rock.

ESS 5: [5] Rocks, minerals and soils have common and practical uses.

Physical Science [PS]

Matter and Motion

PHS 6: [1] All matter is made up of small particles called atoms.

PHS 7: [2] Changes of state are explained by a model of matter composed of atoms and/or molecules that are in motion.

PHS 8: [3] There are two categories of energy: kinetic and potential.

PHS 9: [4] An object's motion can be described by its speed and the direction in which it is moving.

Life Science [LS]

Cellular to Multicellular

LIS 10: [1] Cells are the fundamental unit of life.

LIS 11: [2] All cells come from pre-existing cells.

LIS 12: [3] Cells carry on specific functions that sustain life.

LIS 13: [4] Living systems at all levels of organization demonstrate the complementary nature of structure and function.

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PC-ODE Model Science 7 Curriculum – Topics and Content Statements*
Theme: Order and Organization

Earth and Space Science [ESS]

Cycles and Patterns of Earth and the Moon

ESS 1: [1] The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

ESS 2: [2] Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns.

ESS 3: [3] The atmosphere has different properties at different elevations and contains a mixture of gases that cycle through the lithosphere, biosphere, hydrosphere and atmosphere.

ESS 4: [4] The relative patterns of motion and positions of the Earth, moon and sun cause solar and lunar eclipses, tides, and phases of the moon.

Physical Science [PS]

Conservation of Mass and Energy

PHS 5: [1] The properties of matter are determined by the arrangement of atoms.

PHS 6: [2] Energy can be transformed or transferred but is never lost.

PHS 7: [3] Energy can be transferred through a variety of ways.

Life Science [LS]

Cycles of Matter and Flow of Energy

LIS 8: [1] Matter is transferred continuously between one organism to another and between organisms and their physical environments.

LIS9: [2] In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

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PC-ODE Model Science 8 Curriculum – Topics and Content Statements*
Theme: Order and Organization

Earth and Space Science [ESS]

Physical Earth

ESS 1: [1] The composition and properties of Earth’s interior are identified by the behavior of seismic waves.

ESS 2: [2] Earth’s crust consists of major and minor tectonic plates that move relative to each other.

ESS 3: [3] A combination of constructive and destructive geologic processes formed Earth’s surface.

ESS 4: [4] Evidence of the dynamic changes of Earth’s surface through time is found in the geologic record.

Physical Science [PS]

Forces and Motion

PHS 5: [1] Forces between objects act when the objects are in direct contact or when they are not touching.

PHS 6: [2] Forces have magnitude and direction.

PHS 7: [3] There are different types of potential energy.

Life Science [LS]

Species and Reproduction

LIS 8: [1] Diversity of species occurs through gradual processes over many generations. Fossil records provide evidence that changes have occurred in number and types of species.

LIS 9: [2] Reproduction is necessary for the continuation of every species.

LIS 10: [3] The characteristics of an organism are a result of inherited traits received from parent(s).

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PC-ODE Biology Model Curriculum – Course Content*

Heredity [HER]

- HER 1: [1] Cellular genetics
- HER 2: [2] Structure and function of DNA in cells
- HER 3: [3] Genetic mechanisms and inheritance
- HER 4: [4] Mutations
- HER 5: [5] Modern genetics

Evolution [EVO]

Mechanisms

- EVO 6: [1] Natural selection
- EVO 7: [2] Mutation
- EVO 8: [3] Genetic drift
- EVO 9: [4] Gene flow (immigration, emigration)
- EVO 10: [5] Sexual selection
- EVO 11: [6] History of life on Earth

Diversity of Life

- EVO 12: [7] Speciation and biological classification based on molecular evidence
- EVO 13: [8] Variation of organisms within a species due to population genetics and gene frequency

Diversity and Interdependence of Life [DIV]

- DIV 14: [1] Classification systems are frameworks created by scientists for describing the vast diversity of organisms indicating the degree of relatedness between organisms.
- DIV 15: [2] Ecosystems: Homeostasis (Carrying capacity; Equilibrium and disequilibrium)

Cells [CEL]

Cell structure and function

- CEL16: [1] Structure, function and interrelatedness of cell organelles
- CEL17: [2] Eukaryotic cells and prokaryotic cells

Cellular processes

- CEL18: [3] Characteristics of life regulated by cellular processes
- CEL19: [4] Photosynthesis, chemosynthesis, cellular respiration
- CEL20: [5] Cell division and differentiation

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PC-ODE Chemistry Model Curriculum – Course Content*

Structure and Properties of Matter [STR]

STR 1: [1] Atomic structure

- Evolution of atomic models/theory
- Electrons
- Electron configurations

STR 2: [2] Periodic table

- Properties
- Trends

STR 3: [3] Intramolecular chemical bonding

- Ionic
- Polar/covalent

STR 4: [4] Representing compounds

- Formula writing
- Nomenclature
- Models and shapes (Lewis structures, ball and stick, molecular geometries)

STR 5: [5] Quantifying matter

STR 6: [6] Phases of matter

STR 7: [7] Intermolecular chemical bonding

- Types and strengths
- Implications for properties of substances
 - Melting and boiling point
 - Solubility
 - Vapor pressure

Interactions of Matter [INT]

INT 8: [1] Chemical reactions

- Types of reactions
- Kinetics
- Energy
- Equilibrium
- Acids/bases

INT 9: [2] Gas laws

- Pressure, volume and temperature
- Ideal gas law

INT 10: [3a] Stoichiometry, Part A

- standard stoichiometry

INT 11: [3b] Stoichiometry, Part B

- percent yield/ molarity

INT 12: [4] Nuclear Reactions

- Radioisotopes
- Nuclear energy

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PC-ODE Physical Science Model Curriculum – Course Content*

Study of Matter [MAT]

MAT 1: [1] Classification of matter

- Heterogeneous vs. homogeneous
- Properties of matter
- States of matter and its changes

MAT 2: [2] Atoms

- Models of the atom (components)
- Ions (cations and anions)
- Isotopes

MAT 3: [3] Periodic trends of the elements

- Periodic law
- Representative groups

MAT 4: [4] Bonding and compounds

- Bonding (ionic and covalent)
- Nomenclature

MAT 5: [5] Reactions of matter

- Chemical reactions
- Nuclear reactions

Energy and Waves [ENE]

ENE 6: [1] Conservation of Energy

- Quantifying kinetic energy
- Quantifying gravitational potential energy
- Energy is relative

ENE 7: [2] Transfer and transformation of energy (including work)

ENE 8: [3] Waves

- Refraction, reflection, diffraction, absorption, superposition
- Radiant energy and the electromagnetic spectrum
- Doppler shift

ENE 9: [4] Thermal energy

ENE 10: [5] Electricity

- Movement of electrons
- Current
- Electric potential (voltage)
- Resistors and transfer of energy

Forces and Motion [FOR]

FOR 11: [1] Motion

- Introduction to one-dimensional vectors
- Displacement, velocity (constant, average and instantaneous) and acceleration
- Interpreting position vs. time and velocity vs. time graphs

FOR 12: [2] Forces

- Force diagrams
- Types of forces (gravity, friction, normal, tension)
- Field model for forces at a distance

FOR 13: [3] Dynamics (how forces affect motion)

- Objects at rest
- Objects moving with constant velocity
- Accelerating objects

The Universe [UNI]

UNI 14: [3] History of the universe

UNI 15: [3] Galaxy formation

UNI 16: [3] Stars

- Formation; stages
- Fusion in stars

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