Fair Lawn

Public Schools

Fair Lawn, NJ

Chemistry CP & Honors

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Chemistry CP is a lab science class developed by the Fair Lawn High School Chemistry team and aligned to the NJSLS-S which are correlated to the NJSLS for Language Arts Literacy and for Math

Science Department

Fair Lawn School District

Committee Credits

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Chemistry CP & Honors

I. Course Synopsis

The field of chemistry investigates matter and energy and ways in which these two quantities interact. After completing this course, students should be able to recognize how matter and energy are both quantified (measured) and qualified (observed) in a variety of contexts.
NJDOE Model Curriculum

II. Philosophy & Rationale

This course has been aligned to and developed with the NJSLS-S as its focus. Efforts have been made to integrate aspects of other science standards, particularly the earth and space science standards into this course to assure that students are provided an opportunity to form connections.

All NJSLS-S aligned courses in the Fair Lawn Schools demonstrate a commitment preparing students to become college and career ready as well as the other guiding assumptions of the Frameworks for Science Education (NRC, 2011) and the NJSLS-S including

- Students are born investigators;
- Science instruction should focus on core ideas and practices;
- An understanding of science develops over time;
- Science and engineering require both knowledge and practice;
- Science education must connect to students' interests and experiences; and
- Promoting equity for all students must be a focus of science education.

Additionally, all NJSLS-S aligned courses in the Fair Law Schools integrate the three dimensions discussed in the Frameworks for Science Education and the NJSL-S, including

- Science & Engineering Practices which describe behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems; (NJSLS- PDF)
- Cross Cutting Concepts which link all domains of science and provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically-based view of the world; (NJSL-S PDF) and

- Disciplinary Core Ideas which focus and unite K-12 science, have a broad importance across multiple sciences or engineering disciplines or are a key organizing concept within a single discipline; provide a key tool for understanding or investigating more complex ideas and solving problems; relate to the interests and life experiences of students; are connected to societal or personal concerns that require scientific or technological knowledge; and are teachable and learnable over multiple grades at increasing depth and sophistication. (NJSL-S PDF)

Since coherence is a main dimension of the NJSLS-S, consider reviewing the "story line" for the middle school physical science, life science, earth and space science, and engineering, technology and applications of science, as well as the high school physical science, life science, earth and space science, and engineering, technology and application of science for a full picture of the NJSLS-S philosophy. For a full picture of how these programs are implemented in the Fair Lawn Schools, visit the district curriculum website.

As described in the NJLS-S, technical writing and reading non-fiction is also a focus of our 6-12 science curricula as required by the NJSL-ELA Companion Standards. Students are expected to think critically about data they collect or read about and then express their thoughts through text-based narratives, journal entries, short-constructed response, argument-based writing, and/or in-class discussion.

Differentiated instruction for students at different levels of achievement and specific learning needs (e.g. special education, English Language Learners (ELL), at-risk, and Gifted & Talented) is embedded in targeted scaffolding based on knowledge of each student's interests, needs, and assessment data, including, but not limited to, in class formative and summative assessments.

When deemed appropriate, department teachers will engage students in purposeful paired discussions to share information more effectively, such as the "turn and talk" (Harvey & Daniels, 2009). "Text annotation" could be used, for example to optimize reading comprehension (Daniels & Steineke, 2010).

A particular focus will be made on the cross cutting concepts and the science and engineering processes

III. Scope & Sequence

The Chemistry CP program consists of four thematic units reflective of the NJDOE Model Curriculum. Each unit develops new content with consistent emphasis on the science and engineering processes, disciplinary core ideas, and cross cutting concepts reflective of the Next Generation Science Standards and the Frameworks for Science Education.

Unit 1: Structure & Properties of Matter (16 weeks):

How can one explain the structure, properties, and interactions of matter?

Unit 2: Conservation of Matter (8 weeks):

How do substances react to make new substances?
How can predictions be made and utilized regarding these reactions?

Unit 3: Reaction Rates & Chemical Equilibrium (10 weeks):

How does energy conservation play a role in chemical reactions?
How does energy play a role in the environment?

Unit 4: Nuclear Chemistry (2 weeks):

How do forces within nuclei mediate nuclear processes and define an atom?

IV. Unit Descriptions

Unit 1: Structure & Properties of Matter (16 weeks):

Enduring Understanding:

1. Matter can be understood in terms of the types of atoms present and the interactions between them and within them.
2. Atomic structure and the arrangement of the Periodic Table are the foundation for understanding matter and its interactions.

Essential Questions:

1. How can one explain the structure, properties, and interactions of matter?

Learning Objectives:

NJDOE Model Curriculm Unit 1

HS-PS1-1 (Periodic Table) High School Evidence Statement PS1-1

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.** [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.] [*Assessment Boundary: Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends.*]

HS-PS1-3 (Forces Between Particles) High School Evidence Statement PS1-3

1. **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.** [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [*Assessment Boun dary: Assessment does not include Raoult's law calculations of vapor pressure.*]

HS-PS2-6 (Structure vs. Function) High School Evidence Statement PS2-6

1. **Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.** [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provided molecular structures of specific designed materials.]

HS-PS4-1 (Electromagnetic Spectrum) High School Evidence Statement PS4-1

1. **Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media**. [Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth.] [Assessment Boundary: Assessment is limited to algebraic relationships and describing those relationships qualitatively.]

HS-PS4-3 (Quantum Theory) High School Evidence Statement PS4-3

1. **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.** [Clarification Statement: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, and photoelectric effect.] [Assessment Boundary: Assessment does not include using quantum theory.]

HS-PS4-4 (Evaluating Real-Life Applications of Electromagnetic Radiation) High School Evidence Statement PS4-4

1. **Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.** [Clarification Statement: Emphasis is on the idea that photons associated with different frequencies of light have different energies, and the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. Examples of published materials could include trade books, magazines, web resources, videos, and other passages that may reflect bias.] [Assessment Boundary: Assessment is limited to qualitative descriptions.]

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning.
2. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners *or the* SIOP protocol.
3. Gifted students may be challenged by asking them to form additional connections between biology, chemistry, and physics.

Cross-Content Connections:

HS-ESS-2-5 (Properties of Water & Effect on Earth) High School Evidence Statements ESS 2-5

1. **Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.** [Clarification Statement: Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock

cycle. Examples of mechanical investigations include stream transportation and deposition using a stream table, erosion using variations in soil moisture content, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids).]

NJSLS Math: Click on the link to the High School Evidence Statements to see expectations related to mathematics for this unit. Number Quantity, Algebra, Function, Modeling.
NJSLS Literacy: Click on the link to the High School Evidence Statements to see expectations related to literacy for this unit. In addition, a focus of the course will be on the development of the LAL standards for science & technical subjects.
8.1: Use technology to collect and analyze data and to communicate findings with local peers and peers from other communities.
9.2: Explore careers directly related to this unit.

Unit 2: Conservation of Matter (8 weeks):

Enduring Understanding:

1. Many substances react chemically with other substances to form new substances with different properties.
2. Changes in properties result from the ways in which atoms from the original substances are combined and rearranged in the new substances.

Essential Questions:

1. How do substances combine or change (react) to make new substances?
2. How does one characterize these reactions and make predictions about them?

Learning Objectives:
NJDOE Model Curriculm Unit 2

HS-PS1-2 (Chemical Reactions) High School Evidence Statement PS1-2

1. **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.** [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen.] [*Assessment Boundary: Assessment is limited to chemical reactions involving main group elements and combustion reactions.*]

HS-PS1-7 (Conservation of Atoms & Mass) High School Evidence Statement PS1-7

1. **Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.** [Clarification Statement: Emphasis is on

using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.] [*Assessment Boundary: Assessment does not include complex chemical reactions.*]

HS-PS2-6 (Structure vs. Function) High School Evidence Statement PS2-6

1. **Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.** [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [Assessment Boundary: Assessment is limited to provided molecular structures of specific designed materials.]

HS-PS3-3 (Energy Conversion) High School Evidence Statement PS3-3

1. **Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.** [Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.] [Assessment Boundary: Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.]

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning.
2. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners *or the* SIOP protocol.
3. Gifted students may be challenged by asking them to form additional connections between biology, chemistry, and physics.

Cross-Content Connections:

HS-ESS-2-6 (Carbon Cycle) High School Evidence Statements ESS 2-6

2. **Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.** [Clarification Statement: Emphasis is on modeling biogeochemical cycles that include the cycling of carbon through the ocean, atmosphere, soil, and biosphere (including humans), providing the foundation for living organisms.]

NJSLS Math: Click on the link to the High School Evidence Statements to see expectations related to mathematics for this unit. Number Quantity, Algebra, Function, Modeling.

NJSLS Literacy: Click on the link to the High School Evidence Statements to see expectations related to literacy for this unit. In addition, a focus of the course will be on the development of the LAL standards for science & technical subjects.

8.1: Use technology to collect and analyze data and to communicate findings with local peers and peers from other communities.

9.2: Explore careers directly related to this unit.

Unit 3: Reaction Rates & Chemical Equilibrium (10 weeks):

Enduring Understanding:

1. Energy is exchanged or transformed in all chemical reactions and physical changes of matter.
2. Chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules.

Essential Questions:

1. How does conservation play a role in chemical reactions?

2. How does energy play a role in the environment?

Learning Objectives:

NJDOE Model Curriculm Unit 3

HS-PS1-4 (Energy of Reactions) High School Evidence Statement PS1-4

1. **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.** [Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved.] [*Assessment Boundary: Assessment does not include calculating the total bond energy changes during a chemical reaction from the bond energies of reactants and products.*]

HS-PS1-5 (Effects on Rates of Reactions) High School Evidence Statement PS1-5

1. **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.** [Clarification Statement: Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules.] [*Assessment Boundary: Assessment is limited to simple reactions in which there are only two reactants; evidence from temperature, concentration, and rate data; and qualitative relationships between rate and temperature.*]

HS-PS-1-6 (LeChatelier's Equilibrium Products) High School Evidence Statements PS1-6

1. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* [Clarification Statement: Emphasis is on the application of Le Chatelier's Principle and on refining designs of chemical reaction systems, including descriptions of the connection between changes made at the macroscopic level and what happens at the molecular level. Examples of designs could include different ways to increase product formation including adding reactants or removing products.] [*Assessment Boundary: Assessment is limited to specifying the change in only one variable at a time. Assessment does not include calculating equilibrium constants and concentrations.*]

HS-PS3-1 (Change in Energy) High School Evidence Statement PS3-1

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.** [Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model.] [Assessment Boundary: Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.]

HS-PS3-2 (Energy) High School Evidence Statement PS3-2

1. **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).** [Clarification Statement: Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, the energy stored due to position of an object above the earth, and the energy stored between two electrically-charged plates. Examples of models could include diagrams, drawings, descriptions, and computer simulations.]

HS-PS3-3 (Energy Conversion) High School Evidence Statement PS3-3

1. **Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*** [Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.] [*Assessment Boundary: Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.*]

HS-PS3-4 (Thermodynamics) High School Evidence Statement PS3-4

1. **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).** [Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.] [*Assessment Boundary: Assessment is limited to investigations based on materials and tools provided to students.*]

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning.
2. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners *or the* SIOP protocol.
3. Gifted students may be challenged by asking them to form additional connections between biology, chemistry, and physics.

Cross-Content Connections:

HS-ESS2-4 (Energy & Climate) High School Evidence Statement ESS2-4

1. **Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.** [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1-10 years: large volcanic eruption, ocean circulation; 10-100s of years: changes in human activity, ocean circulation, solar output; 10-100s of thousands of years: changes to Earth's orbit and the orientation of its axis; and 10-100s of millions of years: long-term changes in atmospheric composition.] [*Assessment Boundary: Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.*]

HS-ESS3-5 (Energy & Data Analysis) High School Evidence Statement ESS3-5

1. **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.** [Clarification Statement: Examples of evidence, for both data and climate model outputs, are for climate changes (such as precipitation and temperature) and their associated impacts (such as on sea level, glacial ice volumes, or atmosphere and ocean composition).] [*Assessment Boundary: Assessment is limited to one example of a climate change and its associated impacts.*]

NJSLS Math: Click on the link to the High School Evidence Statements to see expectations related to mathematics for this unit. Number Quantity, Algebra, Function, Modeling.

NJSLS Literacy: Click on the link to the High School Evidence Statements to see expectations related to literacy for this unit. In addition, a focus of the course will be on the development of the LAL standards for science & technical subjects.

8.1: Use technology to collect and analyze data and to communicate findings with local peers and peers from other communities.

9.2: Explore careers directly related to this unit.

Unit 4: Nuclear Chemistry (2 weeks):

Enduring Understanding:

1. Changes occurring in the nucleus of atoms may alter the identity of an atom often resulting in large changes in energy.

Essential Questions:

1. How are nuclei held together by forces to mediate nuclear processes?

Learning Objectives:

NJDOE Model Curriculm Unit 4

HS-PS1-8 (Nuclear Change) High School Clarification Statement PS 1-8

1. **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.** [Clarification Statement: Emphasis is on simple qualitative models, such as pictures or diagrams, and on the scale of energy released in nuclear processes relative to other kinds of transformations.] [*Assessment Boundary: Assessment does not include quantitative calculation of energy released. Assessment is limited to alpha, beta, and gamma radioactive decays.*]

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs and ELL learners may be provided with key vocabulary terms prior to the unit beginning.
2. ELL students may be provided with additional visual aids. For additional modifications, refer to Classroom Instruction that Works for ELL Learners *or the* SIOP protocol.
3. Gifted students may be challenged by asking them to form additional connections between biology, chemistry, and physics.

Cross-Content Connections:

HS-ESS1-1 (Solar Nuclear Fission) High School Clarification Statement ES 1-1

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.** [Clarification Statement: Emphasis is on the energy transfer mechanisms that allow energy from nuclear fusion in the sun's core to reach Earth. Examples of evidence for the model include observations of the masses and lifetimes of other stars, as well as the ways that the sun's radiation varies due to sudden solar flares ("space weather"), the 11-year sunspot cycle, and non-cyclic variations over centuries.] [*Assessment Boundary: Assessment does not include details of the atomic and sub-atomic processes involved with the sun's nuclear fusion.]*

HS-ESS1-3 (Nucleosynthesis of Stars) High School Clarification Statement ES 1-1

1. **Communicate scientific ideas about the way stars, over their life cycle, produce elements.** [Clarification Statement: Emphasis is on the way nucleosynthesis, and therefore the different elements created, varies as a function of the mass of a star and the stage of its lifetime.] [*Assessment Boundary: Details of the many different nucleosynthesis pathways for stars of differing masses are not assessed.*]

HS-ESS3-2 (Energy & Cost Benefit Analysis) High School Evidence Statement ESS3-2

1. **Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*** [Clarification Statement: Emphasis is on the conservation, recycling, and reuse of resources (such as minerals and metals) where possible, and on minimizing impacts where it is not. Examples include developing best practices for agricultural soil use, mining (for coal, tar sands, and oil shales), and pumping (for petroleum and natural gas). Science knowledge indicates what can happen in natural systems—not what should happen.]

NJSLS Math: Click on the link to the High School Evidence Statements to see expectations related to mathematics for this unit. Number Quantity, Algebra, Function, Modeling.
NJSLS Literacy: Click on the link to the High School Evidence Statements to see expectations related to literacy for this unit. In addition, a focus of the course will be on the development of the LAL standards for science & technical subjects.
8.1: Use technology to collect and analyze data and to communicate findings with local peers and peers from other communities.
9.2: Explore careers directly related to this unit.

V. Course Materials

CP Chemistry:

- Davis, Raymond E.; Metcalfe, H. Clark; Williams, John E.; and Castka, Joseph F. *Modern Chemistry.* Austin, TX: Holt, Rinehart, and Winston, 2002

Honors Chemistry:

- Dingrando, Laurel; Gregg, Kathleen V.; Hainen, Nicholas; Lampe, Philip; Roepcke, Cynthia; and Wistrom, Cheryl. *Chemistry: Matter and Change.* New York, NY: Glencoe McGraw-Hill, 2002.

Both Subjects:

- Trout, Laura. *POGIL Activities for High School Chemistry*. Batavia, IL: Flinn Scientific, 2012. Print / Teacher Resource Only

- Sampson, Victor; Carafano, Peter; Enderie, Patrick; Fannin, Steve; Grooms, Jonathon; Southerland, Sherry A.; Stallworth, Carol; and Williams, Kiesha. *Argument-Driven Inquiry in Chemistry.* Arlington, VA: National Science Teachers Association, 2015

VI. Assessments

Classroom assessments are included to primarily guide instruction (formative assessment) and to support decisions made beyond the classroom (summative assessment).

Sample assessments and classroom activities aligned to the NJSLS-S can be found on the NJSLS-S website.

Assessments in this course measure students' performance of scientific and engineering practices in the context of crosscutting concepts and disciplinary core ideas. These may include quizzes, tests, lab reports, lab questions, experimental design projects, engineering design projects, project-based assessments and other assessments with multiple components. (NRC, 2014)

NJDOE Science Related Assessment Resources

All Fair Lawn High School grading procedures will be followed.

HS-ESS3-6 (Human Impact on Earth) High School Clarification Statement ES 3-6

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. [Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from a human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [*Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.*]

VII. Interdisciplinary Connections and Alignment to Technology standards

Science classes in the Fair Lawn Public schools promote career-readiness skills related to Personal Financial Literacy (9.1) and Career Awareness, Exploration, and Presentation (9.2). Some course concepts from the Career and Technical Education Standards (9.3), but these are not directly correlated since our district is not a CTE program.

The Fair Lawn Public Schools District fosters an environment that promotes career-readiness skills in all content areas. Whereas Career Ready Practices are explored consistently, specific alignment to Personal Finance Literacy (9.1) and Career Awareness, Exploration, and Presentation Standards (9.2) are included in the district level document (below). When appropriate, the Career and Technical Education Standards (9.3) have been reviewed and aligned as well.

Examples: 9.2B: Career exploration in each unit of study.

In addition, every effort is made to integrate technology and engineering into our science classes. Educational Technology (8.1) and Technology Education, Engineering, Design, and Computational Thinking – Programming (8.2) standards are cross connected throughout our science programs.

Examples:
8.1A: Use spreadsheets to analyze & interpret data from laboratories, 6-12.
Use the internet to increase productivity and efficiency, 9-12.
8.1B,C: Use data to solve real-world problems, 6-12.
Use online platforms to collaborate & address global issues, 9-12.
8.1F: Collect and analyze data using internet and data simulations, 6-12.
8.2A: Become aware of the invention process, 3-5.
8.2B: Become aware of the global impacts on technology, 6-12.
8.2C: Apply the design process to pushes & pulls, K-2.
8.2D: Use tools to reduce work, K-2.

For additional detail on how these standards are integrated throughout the Fair Lawn Schools curriculum, review the Fair Lawn Public Schools District Alignment to Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix.