Unit 02: The Chemistry of Life

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

LS1: From Molecules to Organisms: Structures and Processes
LS1.A: Structure and Function

Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself acomponent of the next level. (HS-LS1-2)

LS1.B: Growth and Development ofOrganisms

In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complexorganism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

LS1.C: Organization for Matter and Energy Flow in Organisms

The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (suchas proteins or DNA), used for example to form new cells. (HS-LS1-6)

LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.K-12.NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
LA.K-12.NJSLSA.R5	Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LA.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

LA.RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
SCI.1.LS1.A	Structure and Function
SCI.1.LS1.B	Growth and Development of Organisms
SCI.5.LS1.C	Organization for Matter and Energy Flow in Organisms
1-LS1	From Molecules to Organisms: Structures and Processes

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit…

Meaning

Essential Questions

Essential Questions

- What are living things made of?
- What is the relationship between protons, neutrons and electrons?
- How do the elements on the periodic table differ from one another?
- Why is water essential for living things?
- What do cells need to function?
- Why is pH important in maintaining homeostasis
- How does an individual maintain a healthy lifestyle and diet?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

Students will understand that:

- Living things are composed of organic compounds
- Organic compounds are composed of elements found on the periodic table
- Understand the relationship between protons, neutrons and electrons
- Water is an essential component for all living things to be able to maintain homeostasis
- Water has several important properties that make it essential for life
- Cells need carbohydrates, proteins, lipids and nucleic acids for survival
- Maintaining a certain pH is an essential part of maintaining homeostasis
- Carbohydrates, proteins and lipids are an essential part of a healthy diet

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- Living things are made of organic compounds - carbohydrates, proteins, lipids and nucleic acids
- Organic compounds are composed of the elements found on the periodic table
- Elements on the periodic table are composed of protons, neutrons and electrons
- The number of electrons determine the element
- Water helps living things maintain homeostasis
- Cells need carbohydrates, proteins, lipids and nucleic acids
- A substance pH is a measure of the acidity and important for homeostasis
- Carbohydrates, proteins and lipids are an important part of a healthy diet

Skills

Skills

Student will be skilled at …

- Determine the number of protons, neutrons and electrons of the elements on the periodic table
- List and describe the four organic compounds
- Describe how water helps an organism to maintain homeostasis
- Describe what cells need to function
- Determine the pH of a substance using testing strips
- Describe the importance of a healthy diet and how does one maintain a healthy diet

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- Glencoe Biology Textbook
- Tests and quizzes
- Materials needed for lab
- Vocabulary and directed reading packet
- Powerpoints for lecture

Formative Assessment Strategies

Formative Assessment Strategies

exit slips

tests/quizzes

lab assessments

lab write-ups

worksheets

quick thoughts

class discussion

writing assignments

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Periodic Table

1 - Introduction to chemistry

2 - Atomic Structure lecture and exit slip

3 - Atomic Structure lecture and exit slip

4 - periodic table; counting protons

5 - periodic table; counting electrons

6 - periodic table; atomic mass and neutrons

7 - periodic table; valence electrons

8 - periodic table quiz

9 - build an atom lab

10 - adopt an element project

11 - adopt an element project

12 - adopt an element project

13 - adopt an element presentations

14 - chemistry quiz

Water

15 - water lecture and exit slip

16 - water lecture and exit slip

17 - build a water element lab

18 - water lab

pH

19 - pH lecture and exit slip

20 - pH lecture and exit slip

21 - pH lab

Macromolecules

22 - introduction to nutrition

23 - carbohydrates lecture and activity part 1

24 - carbohydrates lecture and activity part 2

25 - lipids lecture and activity part 1

26 - lipids lecture and activity part 2

27 - proteins lecture and activity part 1

28 - proteins lecture and activity part 2

29 - nutrition quiz

Assessment

30 - The chemistry of life review part 1

31 - the chemistry of life review part 2

Hirsh-bio1-cycle5.docx
hhirsh-biol-cycle6.docx
hhirsh-biol-cycle7.docx
hhirsh-biol-cycle8.docx
hhirsh-biol-cycle9.docx

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Glfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to

ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.