**Chemistry**

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| **Current Objectives:****Unit 6 Nomenclature: What is the system used to name chemical compounds?*** **Prerequisites**
	+ Classification of elements in Periodic Trends
* **Connections to future units**
	+ Rules for names and formulas are used in equations and stoichiometry
* **Thinking and Process Skills**
	+ Classifying and generalizing
		- The process of understanding the possible ways that a classification may be carried out, understanding that any classification operation is part of a hierarchal system, selecting different criteria for different purposes, and understanding that one particular criterion does not necessarily allow prediction of others
	+ Hypothetico-deductive reasoning
		- The ability to formulate and test alternative hypotheses against given data
* **Standards**
* MP.2: Reason abstractly and quantitatively
* MP.4: Model with mathematics
* HSN-Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays
* HSN-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
* RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form and
* **Assessments**
	+ Post activity formative assessments
	+ Formative unit quiz
	+ Summative unit test
* **Assessments**
	+ Post activity formative assessments
	+ Formative unit quiz
	+ Summative unit test
 |
| **Date** | **Instruction and Assessments** |
| Monday, Jan 21st  | No School |
| Tuesday, Jan 22nd  | **Unit 6 Nomenclature****Engage: *Are scientists memory experts? Are you?**** Elicit prior knowledge and misconceptions by answering the following questions:
	+ What do pyrite, iron sulfide, and ferrous sulfide have in common? Grain alcohol, ethanol, and ethyl alcohol?
	+ Why is CaO named calcium oxide but CO is named carbon monoxide?
* Student Activity
	+ Test short-term memory by memorizing as many digits of pi as possible

**Explore 1: What Symbols are Used to Represent Elements?*** Read pages 2,3; understand how the current chemical symbols came to exist

**Elaborate 1: What are the Formulas of the Elements?*** Use ideal gas equation to determine hydrogen formula as H2
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| Wednesday, Jan 23rd  | * Begin Developing Nomenclature Skills
	+ Present Unit Guiding Questions
	+ Present Unit Learning Map – partially constructed, students will complete as unit progresses
	+ Handout periodic tables and discuss location of metals and nonmetals
* Discussion w/examples of binary compound formulas and how to recognize the two components of binary compounds
* Nomenclature cooperative learning groups :
	+ Identifying the two components of binary compounds
	+ Classifying the compound as either a metal or nonmetal compound
* Formative discussion while students present the solutions
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| Thursday, Jan 24th  | * Review and continue construction of Nomenclature Unit Learning Map
	+ Recognition of and naming of polyatomic ions
	+ Naming metal compounds
	+ How to determine if a metal has multiple charges
	+ How to name single charge and multiple charge metal compounds
* Handout polyatomic ion reference tables
* Discussion w/examples of what polyatomic ions are, how to recognize them, and where to find them on the polyatomic ion reference tables
* Observe differences between same metal compounds w/different charges; i.e. Fe2+&Fe3+
* Nomenclature cooperative learning groups:
	+ Naming metal compounds, both with and w/o polyatomic anions
 |
| Friday, Jan 25th  | * Review and continue construction of Nomenclature Unit Learning Map
	+ Recognition of and naming of polyatomic ions
	+ Naming metal compounds
	+ How to determine if a metal has multiple charges
	+ How to name single charge and multiple charge metal compounds
* Observe differences between same metal compounds w/different charges; i.e. Fe2+&Fe3+
* Nomenclature cooperative learning groups:
	+ Naming metal compounds, both with and w/o polyatomic anions
	+ Nomenclature Problems #1
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**Physics**

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| **Mechanics****Unit: Circular Motion/Forces in Two Dimensions****Objectives*** Uniform circular motion occurs when there is a net force acting towards the center of a circular path
* The force of static friction is the centripetal force that allows a car to turn
* Normal force is the centripetal force that will keep an object in contact with the inside surface of a rotating object
* Apply circular motion concepts of centripetal force and tangential velocity to the orbit of the Earth around the Sun
* Understand the impact of Newton’s Universal Law of gravity and apply the formula to calculate the gravitational force of attraction between two objects
* Apply circular motion equations to Newton’s Universal Law of Gravitation to derive circular orbit equations
* Use a simulator to determine how astronomers find extra-solar planets

**Standards*** + MP.2: Reason abstractly and quantitatively
	+ MP.4: Model with mathematics
	+ HSN-Q.A.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays
	+ HSN-Q.A.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	+ RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed visually or mathematically into words

**Assessments*** + Laboratory activity summative assessments
	+ Formative assessments
	+ Unit Test
 |
| **Date** | **Instruction and Assessments** |
| Monday, Jan 21st  | No School |
| Tuesday, Jan 22nd  | **Mechanics****Unit: Circular Motion**Pre-assessment: Circular MotionObjective: Students will be review basic force concept and equations required for understanding base derivation of circular motion concepts and equations and apply knowledge on pre-assessment quiz.1. Brief Introduction and Question period to gain rapport
2. Brief explanation of unit and purpose for pre-assessment
	1. Outline unit and components that will be covered such as Circular motion and Newtons law of Gravity
	2. Demonstrate proof of F=ma for 2d is f=m x v^2/r for circular motion.
3. Pre-assessment
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| Wednesday, Jan 23rd  | Lesson 1: What is centripetal force Objective: Students will be exposed to the basics centripetal force and it distinguish it from the imaginary or centrifugal force 1. Visual activity
	1. Students will observe a container of water being spun in circles on a platform.
2. Lab
	1. Students will be allowed to try demonstration in groups
	2. Following demonstration and during lab, students will be handed work sheet with conceptual questions to be discussed and answered in groups along with personal observations they believe to be relevant
3. Conceptual explanation
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| Thursday, Jan 24th  | Lab Quiz: Assess comprehension of conceptual understanding and problem solving skills related to previously completed labLesson 2: Playing Around with Circular MotionObjective: Students will explore the causes of circular motion using manipulatives and Newton’s Laws of Motion1. Brainstorm situations involving circular motion
	1. Intro with first part of centripetal acceleration presentation
	2. Group work – each group will whiteboard one example
2. Exploring circular motion activity
	1. After introduction, students will work in their groups to complete the two investigations
3. Activity debrief and discussion
4. Circular motion homework; due at beginning of next class
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| Friday, Jan 25th  | Lesson 12: Can You Make the TurnObjective: Students will apply the concept of centripetal force caused by friction to calculate the max speed at which a car can safely make a turn1. Do Now: Centripetal force slide with all the measurement needed to calculate a centripetal force on a windmill blade
	1. After reviewing the solution, students will watch a video of a large windmill blade failing
	2. Review homework solutions
2. Make the Turn Activity
	1. Student examples of forces that could cause circular motion
3. Group work; students will work on Circular Motion Problems that will be collected at end of class
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**Applied Science of Molecular Technology**

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| **Current Objectives:****Unit Synthetic Biology; Biobiulder*** **Objective Learning Goals and Skills**
	+ Build a basic understanding of the field of synthetic biology
	+ Complete synthetic biology tutorials to review/reinforce concepts of molecular biology and cloning as related to synthetic biology
	+ Inquiry Activity – Gene Splicing Lab: DNA Ligation and Colony Transformation
		- Concepts and skills:
			* DNA Plasmids
			* Constructing recombinant DNA
			* Microbiology lab techniques
			* Transformation of E. coli
			* Antibiotic resistant genes

**Standards*** + RST.9-10.7, WHST.9-12.2, HS-LS1-1, HS-LS3-1

**Assessments*** + Post activity formative assessments
	+ Laboratory reports
	+ Laboratory quizzes
	+ Summative quizzes
	+ Formative unit quiz
	+ Summative unit test
 |
| **Date** | **Instruction and Assessments** |
| Monday, Jan 21st  | No School |
| Tuesday, Jan 22nd  | **Synthetic Biology: Fundamentals of Synthetic Biology**Objectives: Students will be able to answer ‘What is Synthetic Biology?’ and be introduced to the principles of engineering and design**Evaluation of iGEM Projects** Students will work in pairs to evaluate past award winning projects of the International Genetically Engineered Machines competition. The following parts of the projects will be identified and evaluated:* Problem being addressed
* System design
* Chassis selection
* Device(s)
* Parts used to construct device(s)
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| Wednesday, Jan 23rd  | **Synthetic Biology: Fundamentals of Synthetic Biology**Objectives: Students will be able to answer ‘What is Synthetic Biology?’ and be introduced to the principles of engineering and design**Evaluation of iGEM Projects** Students will work in pairs to evaluate past award winning projects of the International Genetically Engineered Machines competition. The following parts of the projects will be identified and evaluated:* Problem being addressed
* System design
* Chassis selection
* Device(s)
* Parts used to construct device(s)
* Construct Presentation Poster of iGEM project
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| Thursday, Jan 24th  | **Synthetic Biology: Fundamentals of Synthetic Biology**Objectives: Students will be able to answer ‘What is Synthetic Biology?’ and be introduced to the principles of engineering and design* **iGEM Poster Session/Gallery Walk**
	+ Each group will display their poster
	+ Gallery Walk
	+ Students will evaluate each group’s poster and provide feedback
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| Friday, Jan 25th  | **Synthetic Biology; Biobuilder*** **Biobuilder Lab Activity: Eau That Smell Introduction**
* Students will complete this activity with genetically modified E.coli strains to learn.
	+ Microbiology techniques
	+ Population growth dynamics
	+ Molecular genetics
	+ Basic synthetic biology concepts
* Fundamentals of Synthetic Biology/Biodesign and DNA Engineering
	+ Begin take home quiz
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**Earth Science**

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| **Current Objectives:****Unit – Earth’s History****Objectives*** Understand how early Earth was formed from colliding material and how these collisions continue to affect Earth and life on Earth
* Differentiate between relative and absolute dating and correctly apply the laws of superposition, uniformitarianism, and original horizontality
* Identify intrusions, extrusion, folding, faulting, and contact metamorphism in rock layers and determine the relative age of various rock layers using cross-cutting relationships.
* Identify unconformities and establish a geological sequence in rock layers.
* Describe Earth’s early atmosphere and identify how primitive organisms influenced Earth’s early atmosphere.
* Define fossils as remnants of living organisms and differentiate between eon, era, period, and epoch.
* Identify the characteristics of index fossils and use fossils to correlate rock layers.
* Define evolution and identify evidence of evolution in the geologic fossil record.
* Find the absolute age of rocks and fossils using radioactive dating and half-life information.
* Complete a lab modeling the half-life of a radioactive element.

**Assessments*** Formative assessment throughout unit and end of unit cumulative
* Exit Tickets
* Contribution to lab/activity group work
* Quizzes
* Presentation of work; making thinking visible
* Unit summative assessment

**Standards**RST11-12.1, HS-ESS1-5, HS-ESS1-6, HS-ESS2-7, HS-LS4-1, HS-LS4-2, HS-LSS4-5, MP1, MP2, MP4 |
| **Date** | **Instruction and Assessments** |
| Monday, Jan 21st  | No School |
| Tuesday, Jan 22nd  | **Unit Evolution of Earth and Organisms****Lesson 1: Making of the Fittest – Natural Selection and Adaptation**Goals: Students will construct correct conceptual understanding of how changes to the surface of earth can lead to changes in the genotype and phenotype of a population1. Students will be presented with the goals of the lesson
2. Watch HHMI Making of the Fittest
3. Answer related questions in cooperative learning groups
4. Groups will then share out randomly selected questions to lead class discussion

**Lesson 2: Introduction to Human Evolution, Part 1**Goals: Students will construct correct conceptual understanding of how the process of evolution lead to the appearance of the species Homo sapiens1. Engage – Students will answer pre-activity questions
2. Watch Crash Course/Big History: Human Evolution
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| Wednesday, Jan 23rd  | **Lesson 2: Introduction to Human Evolution, Part 2**Goals: Students will construct correct conceptual understanding of how the process of evolution lead to the appearance of the species Homo sapiens1. Working in cooperative learning groups, students will answer questions for Crash Course/Big History: Human Evolution
2. Group share-out to lead class discussion

**Lesson 3: HHMI: Biology of Skin Color**Goals: Student will construct correct conceptual understanding of how environmental physical differences lead to different allele frequency related to skin color in different populations of humans.1. Engage – Students will answer pre-activity questions to trigger
	1. Students will be presented with the goals of the lesson
2. Begin watching HHMI Biology of Skin Color and answering questions
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| Thursday, Jan 24th  | **Lesson 3: HHMI: Biology of Skin Color**Goals: Student will construct correct conceptual understanding of how environmental physical differences lead to different allele frequency related to skin color in different populations of humans.1. Complete Video and questions

**Lesson 4: Human Skin Color: Evidence for Selection**Goals: Students will construct correct conceptual understanding of human populations living in different parts of the world have different sets of evolutionary adaptations and use real data to propose hypothesis, make predictions, and justify claims with evidence.1. Introduce lesson goals
2. Students will begin activity, working in groups
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| Friday, Jan 25th  | **Lesson 4: Human Skin Color: Evidence for Selection**Goals: Students will construct correct conceptual understanding of human populations living in different parts of the world have different sets of evolutionary adaptations and use real data to propose hypothesis, make predictions, and justify claims with evidence.1. Introduce lesson goals
2. Explain activity
3. In cooperative learning groups, begin working on parts 1-4 of activity
	1. As groups complete each part, groups will share out and participate in class discussion
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