

NGSS Chemistry

What you can expect

Case components
Polymers such as ABS and/or metals such as aluminum, iron, magnesium



Screen components
Silicon oxide (glass) strengthened by addition of aluminum, sodium, potassium

Processor components
Silicon, common metals (copper, tin, gold), uncommon elements (yttrium, gadolinium)

Battery components
Lithium combined with other metals such as cobalt, iron, copper

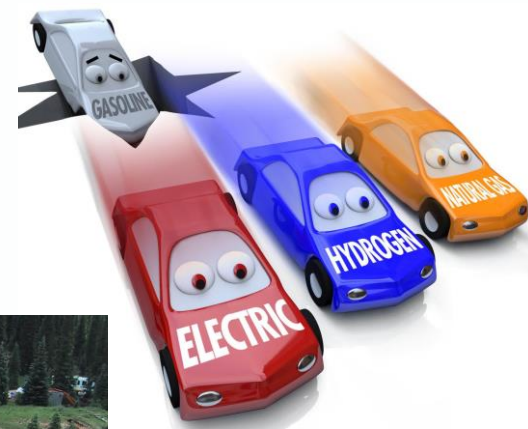
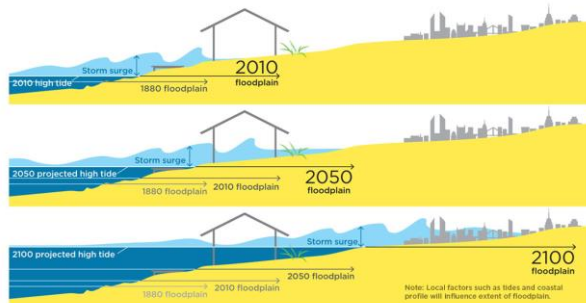


FIGURE 3. Storm Surge and High Tides Magnify the Risks of Local Sea Level Rise



Sea level sets a baseline for storm surge—the potentially destructive rise in sea height that occurs during a coastal storm. As local sea level rises, so does that baseline, allowing coastal storm surges to penetrate farther inland. With higher global sea levels in 2050 and 2100, areas much farther inland would be at risk of being flooded. The extent of local flooding also depends on factors like tides, natural and artificial barriers, and the contours of coastal land.

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Outcomes

By the end of this session, we will:

- Explain the paradigm shifts in MCPS NGSS Chemistry,
- Explore the breadth and depth of content within the course,
- Discuss how this course prepares students for the MISA, AP/IB, college and career.



Herald T. Douglas, Ph.D.

Time as an educator, not just MCPS

Three dimensional teaching experience

Use of assessments

Applicable prior experience, such as second career changers

Curriculum development involvement, if applicable



Rachelle Large

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Allison Nofzinger

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Integrated Science Curriculum

Earth and Space Science through the lens of Chemistry

Corequisite: Geometry A/B

Biology	
LS1.A	HS-LS1-1.
	HS-LS1-2.
LS1.B	HS-LS1-3.
	HS-LS1-4.
LS1.C	HS-LS1-5.
	HS-LS1-6.
	HS-LS1-7.
LS2.A	HS-LS2-1.
	HS-LS2-2.
LS2.B	HS-LS2-3.
	HS-LS2-4.
	HS-LS2-5.
LS2.C	HS-LS2-6.
	HS-LS2-7.
LS2.D	HS-LS2-8.
LS3.A	HS-LS3-1.
LS3.B	HS-LS3-2.
	HS-LS3-3.
LS4.A	HS-LS4-1.
LS4.B	HS-LS4-2.
	HS-LS4-3.
LS4.C	HS-LS4-4.
	HS-LS4-5.

ESS2.E	HS-ESS2-7.
ESS3.B	HS-ESS3-1.
ESS3.C	HS-ESS3-3.
	HS-ESS3-4.

Chemistry	
PS1.A	HS-PS1-1.
	HS-PS1-2.
	HS-PS1-3.
PS1.B	HS-PS1-4.
	HS-PS1-5.
	HS-PS1-6.
PS1.C	HS-PS1-7.
	HS-PS1-8.
PS3.B	HS-PS3-1.
	HS-PS3-4.
PS3.D	HS-PS3-3.
PS1.B	HS-PS1-2.
	HS-PS1-4.
PS1.C	HS-ESS1-5.
	HS-ESS1-6.
PS3.D	HS-PS3-4.
	HS-PS4-5.
	HS-LS2-5.
ESS2.C	HS-ESS2-5.
	HS-ESS2-4.
ESS2.D	HS-ESS2-6.
ESS3.A	HS-ESS3-2.
ESS3.D	HS-ESS3-5.
	HS-ESS3-6.
ESS2.D	HS-ESS2-7.
	HS-ESS3-6.
ESS3.A	HS-ESS3-1.

Physics	
PS2.A	HS-PS2-1.
	HS-PS2-2.
PS2.B	HS-PS2-3.
	HS-PS2-4.
	HS-PS2-5.
PS3.A	HS-PS2-6.
	HS-PS3-2.
PS3.C	HS-PS3-5.
PS4.A	HS-PS4-1.
	HS-PS4-2.
	HS-PS4-3.
PS4.B	HS-PS4-4.
	HS-PS4-5.
PS2.B	HS-PS1-1.
PS3.A	HS-PS1-3.
	HS-PS2-5.
PS3.B	HS-PS3-1.
PS3.B	HS-PS3-3.
	HS-PS2-5.
PS3.B	HS-PS3-1.
PS4.A	HS-PS3-4.
	HS-ESS2-3.
PS4.B	HS-PS4-3.
	HS-PS4-5.

ESS1.A	HS-ESS1-1.
	HS-ESS1-2.
ESS1.B	HS-ESS1-3.
	HS-ESS1-4.
ESS2.A	HS-ESS2-1.
	HS-ESS2-2.
ESS1.B	HS-ESS2-3.
	HS-ESS2-4.
ESS2.A	HS-ESS2-4.
ESS2.B	HS-ESS1-5.
	HS-ESS2-1.
ESS2.B	HS-ESS2-3.
	HS-ESS2-3.



What you will learn in Chemistry



	Three Dimensions of Science Learning		
Unit and Project Focus	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>1: Diversity of Elements</p> <p>Project Focus: Chemistry of Everyday Objects</p>	<ul style="list-style-type: none"> Developing and Using Models Constructing Explanations Asking Questions and Defining Problems Constructing Explanation and Designing Solutions Obtaining, Evaluating, and Communicating Information 	<ul style="list-style-type: none"> Structure and Properties of Matter Chemical Reactions Nuclear Processes Types of Interactions The Universe and Its Stars History of Planet Earth 	<ul style="list-style-type: none"> Patterns Energy and Matter Stability and Change Influence of Science, Engineering, and Technology on Society and the Natural World

Case components
Polymers such as ABS and/or metals such as aluminum, iron, magnesium

Screen components
Silicon oxide (glass) strengthened by addition of aluminum, sodium, potassium

Processor components
Silicon, common metals (copper, tin, gold), uncommon elements (yttrium, gadolinium)

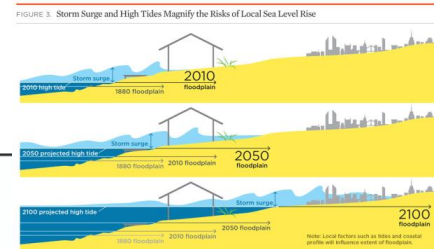
Battery components
Lithium combined with other metals such as cobalt, iron, copper



What you will learn in Chemistry



	Three Dimensions of Science Learning		
Unit and Project Focus	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>2: Water Moving Matter</p> <p>Project Focus: Chemistry of Sea Level Rise</p>	<ul style="list-style-type: none"> ● Planning and Carrying Out Investigations ● Analyzing and Interpreting Data ● Developing and Using Models ● Constructing Explanations and Designing Solutions 	<ul style="list-style-type: none"> ● Roles of Water in Earth's Surface Processes ● Structure and Properties of Matter ● Global Climate Change ● Optimizing the Design Solution 	<ul style="list-style-type: none"> ● Structure and Function ● Patterns ● Stability and Change



Sea level sets a baseline for storm surge—the potentially destructive rise in sea height that occurs during a coastal storm. As local sea level rises, so does that baseline, allowing coastal storm surges to penetrate further inland. With higher global sea levels in 2050 and 2100, areas much farther inland would be at risk of being flooded. The extent of local flooding also depends on factors like tides, natural and artificial barriers, and the contours of coastal land.



What you will learn in Chemistry



	Three Dimensions of Science Learning		
Unit and Project Focus	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
3: Chemical Reactions Project Focus: Chemistry involved in Acid Mine Drainage Remediation	<ul style="list-style-type: none">• Developing and Using Models• Using Mathematics and Computational Thinking• Constructing Explanations and Defining Solutions	<ul style="list-style-type: none">• Structure and Properties of Matter• Chemical Reactions• Types of Interactions• Optimizing the Design Solution	<ul style="list-style-type: none">• Energy and Matter• Patterns• Stability and Change



What you will learn in Chemistry



	Three Dimensions of Science Learning		
Unit and Project Focus	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>4: Earth's BioGeoChemical Cycles</p> <p>Project Focus: Chemistry of Alternative Fuel Vehicles</p>	<ul style="list-style-type: none"> Developing and Using Models Planning and Carrying Out Investigations Using Mathematics and Computational Thinking Constructing Explanations and Defining Solutions Engaging in Argument with Evidence 	<ul style="list-style-type: none"> Definitions of Energy Conservation of Energy and Energy Transfer Energy in Chemical Processes Defining and Delimiting an Engineering Problem Earth Materials and Systems Weather and Climate Biogeology 	<ul style="list-style-type: none"> Energy and Matter Cause of Effect Systems and Systems Models Stability and Change



Inquiry-Based Learning



Units and lesson sequences model *inquiry-based learning* to understand and explain *real-world phenomena*

Encourages acting like scientists:

- Questioning
- Exploration and experimentation
- Evaluation of evidence
- Discussion of possible solutions
- Making claims supported by data/evidence
- Constructing explanations
- Critical thinking

HS MISA Released Item

9 Which statement **best** describes the predicted sea ice melt is

A All impacts are irreversible and severe weather events will continue to rise and

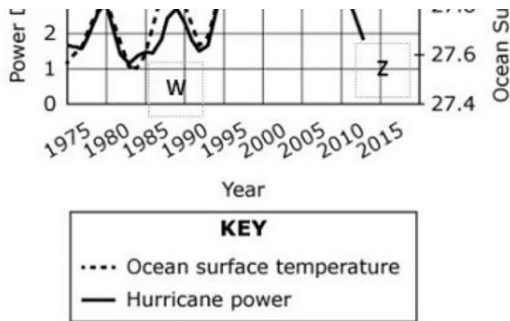
Use the data and models to predict the future effect of global carbon emissions on Earth's systems.

C All impacts are reversible and Earth's systems will

D Some impacts may be reversible if temperatures may be restored.

A scientist merged two graphs to compare ocean surface temperatures with hurricane power. The scientist claimed that an increase in ocean surface temperatures causes more powerful hurricanes to occur. Select the location(s) on the graph that support the scientist's claim.

Ocean Surface Temperatures and Hurricane Power



of humans on the

continue to rise and

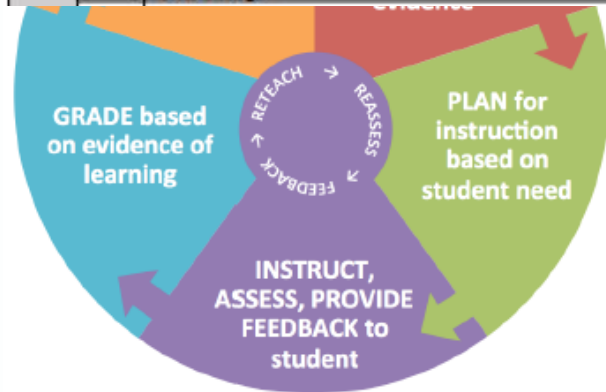
naturally and over time conditions.

missions are reduced, sea ice could be

Scientific Literacy for All Students

The Instructional Cycle

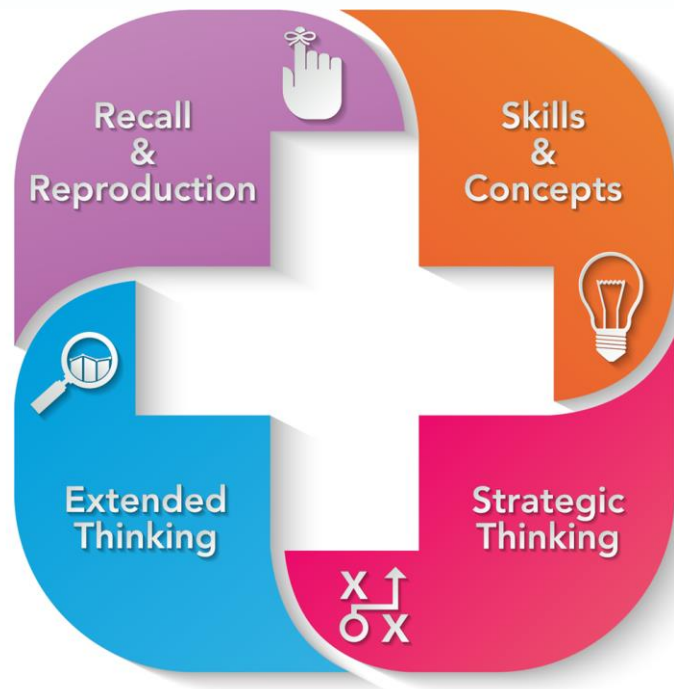
2	Relationships
a	Students develop five distinct models to illustrate the relationships between components underlying the nuclear processes of 1) fission, 2) fusion and 3) three distinct types of radioactive decay.



- ★ Implementation of culturally relevant instruction
- ★ Establishment of caring relationships

Honors Adaptations for Enriched Learning

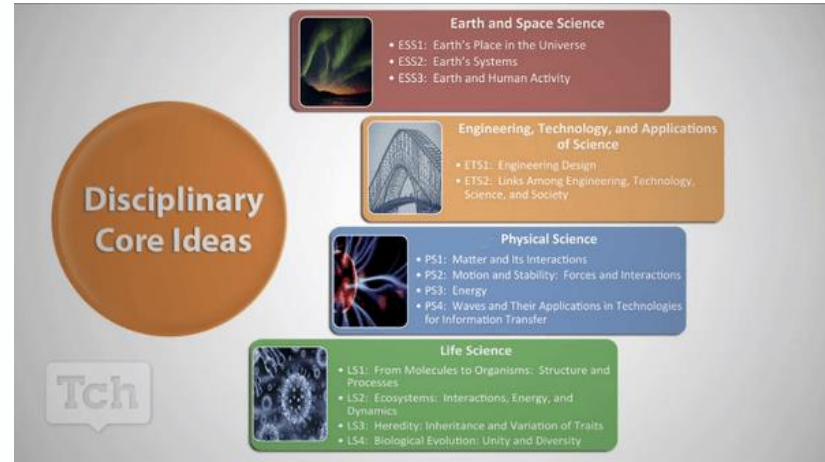
- Why can the knowledge be used?
- How else can the knowledge be used?



Preparation for AP/IB Science

Core NGSS courses prepare students for the cognitive demands of AP or IB science courses

- Science and engineering practices and crosscutting concepts add rigor
- Include what every student MUST know
- NGSS evaluated and aligned with AP and IB standards.



Questions?

Index Card:

please include your contact info

Online form:

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For more information on enrolling your student in this course, please contact the Counselor and/or the Science Department Resource Teacher at your high school.

bit.ly/SciNight19

