Adopted	Course Overview					
Textbook:	<i>Biology</i> is a one-year	course designed to	meet the Biologica	l Science Requir	ements for graduation. Students will	
	protogy is a one year course designed to meet the Diological Science Requirements for graduation. Stadents with					
Miller &	engage in the practice	es of science to help	them understand I	iow scientific kno	owiedge develops as well as gain an	
Levine	appreciation for the v	vide range of approa	iches used to invest	tigate, model and	explain the world. Such practices	
Biology	will include learning	how to develop and	use models, plann	ing and carrying	out investigations, analyzing and	
Diology	interpreting data as w	ell as engaging in a	roument from evid	ence Academic	content will focus on core ideas that	
Lauratha Eall						
Length: Full	will help students dev	velop a broader and	deeper understand	ing of content so	that it can be used to make sense of	
Y ear	new information and	resolve authentic pr	oblems. First sem	ester will begin v	with the nature of science and	
Grades: 9,	transition to the study	of structures and p	rocesses of organis	sms before conclu	ding with the inheritance and	
10, 11, 12	variation of traits. Se	cond semester will b	begin with the stud	y of the ecosystem	m dynamics and cycles of	
	matter/energy transfe	r. and conclude with	n biological change	e over time.	5	
	Needs to be Edited or de	eveloped	8 8			
	Not being used in cu	irriculum currently				
			Unit One			
		Nature and	d Process of Scien	ce (3 weeks)		
STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUGGESTED ACTIVITIES	
	-			STANDARDS &		
				CONNECTIONS		
Investigation	Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1	
Investigation <u>1</u>	Investigation 1 **Collaborative Activities**	Investigation 1 1. What is the process of	Investigation 1 1. What is the process of	Investigation 1 1. What is the	Investigation 1 1. What is the process of science?	
Investigation <u>1</u> Nature of	Investigation 1 **Collaborative Activities** 1. What is the process of	Investigation 1 1. What is the process of science?	Investigation 1 1. What is the process of science?	Investigation 1 1. What is the process of science?	Investigation 1 1. What is the process of science? **Collaborative Activities**	
Investigation <u>1</u> Nature of Science	Investigation 1 **Collaborative Activities** 1. What is the process of science?	Investigation 1 1. What is the process of science? Vocabulary terms	Investigation 1 1. What is the process of science? **Summative	Investigation 1 1. What is the process of science? E.Culturally-	Investigation 1 1. What is the process of science? **Collaborative Activities** I)Communication skill	
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Investigation 1 Nature of Science P4, P6, P5, NOS2, NOS7	Investigation 1 **Collaborative Activities** 1. What is the process of science? a. How does science work? b. How do scientists test ideas?	Investigation 1 I. What is the process of science? Vocabulary terms Science, Hypotheses, evidence, data, Natural world The process of science is ongoing and centers	Investigation 1 1. What is the process of science? **Summative Assessment: Quiz 1. Explain the major themes that make up the scientific process. 2. Connect scientific	Investigation 1 1. What is the process of science? E.Culturally- knowledgeable students demonstrate an awareness and appreciation of the relationships and	Investigation 1 1. What is the process of science? **Collaborative Activities** I)Communication skill • What's Your Point? Activity <u>https://www.dol.gov/odep/topics/youth/softskills/Com</u> <u>munication.pdf</u> II)Team Building • Kagan Activity (refer to Kagan book)	
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		Scientists can test ideas			http://www.indiana.edu/~ensiweb/lessons/crime.html
		by examining events and		3 demonstrate an	Alaska Native Knowledge Network Resources
		processes long past very		understanding of the	People of Kauwerak: Legends of the Northern Eskimo
		distant and not directly		relationship between	http://www.alaskool.org/pative_ed/bistoricdocs/people
		observable as well as		world view and the	of knywersk/Knywersk np htm#top
		testing ideas through		world view and the	of Kauwelak/Kauwelak pp.htm#top
		testing ideas through		way knowledge is	I want is the intervention of the second sec
		experimental procedure		formed and used.	inupiat foliquisiat: Those things that make us who we
		(historical vs.			
		experimental)		Collaborative	<u>http://www.ankn.uaf.edu/curriculum/Inupiaq/Ilitqusiat/</u>
				Activity	<u>index.ntml</u>
		Scientists look for		1.Communication	
		patterns in their		skill	Masterworks of Yupik Science and Survival
		observations and data.		2. Team building	http://www.yupikscience.org/
		Raw data must be			Cultural education:
		analyzed and interpreted			http://www.ankn.uaf.edu/ANCR/Yupiaq/Yaav2001.pdf
		before we can tell			
		whether a scientific idea			
		is likely to be accurate or			
		inaccurate.			
		Scientists work			
		collaboratively			
Investigation 2	Investigation 2	condocrativery.	Investigation 2	Investigation 2	Investigation 2
Science Fair	2. How can we demonstrate	Investigation 2	2. How can we	2.How can we	2. How can we demonstrate the process of science?
Selence I un	the process of science?	2 How can we	demonstrate the	demonstrate the	which can be demonstrate the process of sciencer
	the process of science.	demonstrate the process	process of science?	nrocess of science?	Understanding the Science FlowChart
		of science?	process of science.	process of science.	https://undsci.berkeley.edu/lessons/introducing.flow.h
		of science.			s html
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					The Gummy Bear Challenge Activity ndf
					The Guinniy Dear Chanenge Retryity pur
					Other Resources
					Exploring Bounding Balls
					https://undsci.berkeley.edu/lessons/bouncing_balls.htm
					1
					Oh, Puh-leeeeeeze! Activity
					https://www.dol.gov/odep/topics/youth/softskills/Com
					munication.pdf
Investigation	Investigation 3		Investigation 2	Investigation 2	~Investigation 3
	1 What is asigned?	Investigation 2	1 Explain that asianas	E Culturally	-
NOS2 NOS2	2 What are hypotheses?	<u>~Investigation 3</u>	a both a body of	E.Culturally-	Graphic Organizer of the institution of science/use cut-
NO52, NO53, NO55, D2, D4	2. what are hypotheses?	ideas with ovidence from	a both a body of	students demonstrat-	outs from magazines
NUSS, PS, P4,	J.110W does our	nucas with evidence from	showledge and process	students demonstrate	
PO	understanding of the natural	natural world and	of building knowledge	an awareness and	
	world change?	exposing ideas to testing.	about the natural world.	appreciation of the	
		Scientific knowledge is	2 Explain that science is	processes of	
		open to question and	2.Explain that science is	internation of all	
		open to question and	uncertain and as new	interaction of an	

		revision as new ideas surface and new evidence is discovered. Hypotheses are proposed explanations for a narrow set of phenomena.	evidence is revealed ideas may change. 3. Identify testable hypotheses that are informed from observations or recerrch	elements in the world around them. 1.recognize and build upon the inter- relationships that exist among the spiritual natural and	
		Hypotheses are usually inspired and informed by previous research and/or observations.	Cooperative Objective 4.Explain the importance of being specific when offering and receiving communication.	human realms in the world around them, as reflected in their own cultural traditions and beliefs as well as those of others.	
				3.demonstrate an understanding of the relationship between world view and the way knowledge is formed and used.	
	From	Molecules to Orga	Unit Two misms: Structure	and Function (6	-8 weeks)
STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTUDAL	
				STANDARDS & CONNECTIONS	SUGGESTED ACTIVITIES

a) How do as massive the set	which any one quaters :-	anoone of the nomination	https://www.assadu.astion.as/	1/2
g) now does passive transport	which any one system is	organs of the nervous	https://www.aeseducation.com/ousinesscenter/	<u>-1/3-</u>
WOIK (made up of numerous	and urinary systems	best-collaborative-learning-lesson-plans-for-mi	luule-
n now does active transport	parts and is liself a		School Overt #1	
WOIK! Test #1	lowel	4 Malza dinastianal	Quest #1	
	level.	4. Make directional	a-c) Life is Cenular	
a)How do single-celled		hypotheses that specify	- Investigation Case Study about I	viax
organisms maintain	Test #1 Vocabulary	what happens to a	(screensnot in tolder) Referen	ce:
homeostasis?	l issue, organ, organ	dependent variable	Chapter Mystery In Miller & Levir	ne
b)How do the cells of a	system, receptor,	when an independent	Biology textbook (p. 189)	
multicellular organism work	homeostasis, negative	variable is manipulated.	- KWL Chart	
together to maintain	feedback,	~ .	- Content in textbook: Life is Cel	llular
homeostasis?		<u>Cooperative</u>	PP. 242-247 in Biology textbook	
c) How is human body		<u>Objectives</u>	- Material: Levels of Organization	(pdf in
organized?		•	folder)	
d) What is homeostasis?			- Quick Lab/Demo: What is a cel	1? (pp
e) What are the major organ		Project Component	243 in textbook)	
systems and their functions?		Demonstrations, lab	- Activity: Teachers Pay Teacher	S
f) What are the structures and		Rubrics?	Microscope Coloring- Reading +	
functions of the urinary			Coloring (pdf in folder and online	e)
system?			d-f) Cell Structure	
g) What are the structures and			- Content in textbook: Cell Struc	ture
functions of the nervous			PP. 248-257 in Biology textbook	< Contract of the second secon
system?			- Activity: Cells alive! Website + 0	Cell Lab
h)How do the organ systems			(in folder)or another interactive	Э
interact to provide specific			website	
functions for the human			 Demo: Semi-permeable membra 	ane p 3
body?			in Diffusion/Osmosis Activities (p	odf in
I)What happened to Michele?			folder)	
			g-h) Cell transport	
			- Content in Textbook: pp 260-2	65
			- Demo: Diffusion and molecular	
			movement p 3 in Diffusion/Osmo	osis
			Activities (pdf in folder)	
			 Lab: Osmosis Lab (pdf in folder) 	or
			Osmosis, Diffusion and Egg Experiments	
			https://www.stevespanglerscience.com/lab/exp	eriments
			/growing-and-shrinking-egg/	
			http://www.adfg.alaska.gov/static-	
			sf/Region1/amphib/pdfs/osexp.pdf	
			- Cell Transport Reading (in fold	er)
			- Video: Osmosis/Diffusion Video	on
			youtube	
			Test #1	
			a-d)Homeostasis and Cells	
			- Content in Textbook (Cells and	d
			Homeostasis): pp. 266-269	
			- Content in Textbook (Organiza	ation of
			Human Body): pp 904-909	
			- Activity: Draw a concept map to	model

					 level of organization (pg. 268 in textbook) e-I) Organization of Human Body Content in Textbook (urinary and endocrine systems): pp. 913-914, 930-932) Activity: All Systems Go! Worksheet + answer key (pdf in folder) Material: The Biology Classroom website (hyponatremia, urinary system. Notes, etc.) Material: Scientific American, Strange But True article- updated version? (pdf in folder)
Investigation 2 HS-LS1-3	Investigation 2 2.How can you provide evidence that feedback mechanisms maintain homeostasis? a. What is homeostasis? b. How is feedback inhibition (positive and negative) used to return the body back to its normal, homeostatic state? What are examples of each? c. How do organ systems interact to adjust heart rate in the human body?	Investigation 2 2. How can you provide evidence that feedback mechanisms maintain homeostasis? Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (neg. feedback) what is going on inside the living system.	Investigation 2 2.How can you provide cvidence that feedback mechanisms maintain homeostasis? **Summative assessment: Heartrate Lab Conduct an <u>investigation</u> to provide evidence that feedback mechanisms maintain homeostasis.	Investigation 2 2.How can you provide evidence that feedback mechanisms maintain homeostasis?	Investigation 2 2.How can you provide evidence that feedback mechanisms maintain homeostasis? **Collaborative Activities** I)Communication skill - What's Your Point? Activity https://www.dol.gov/odep/topics/youth/softskills/Com munication.pdf - Oh, Puh-leeeeeeeze! Activity https://www.dol.gov/odep/topics/youth/softskills/Com munication.pdf - What do you admire about people in your life? https://www.aeseducation.com/blog/what-is- collaborative-learning-and-how-do-you-use-it 2 II)Team Building - Kagan Activity (refer to Kagan book) - The Line Game- Collaborative learning practice https://www.aeseducation.com/businesscenter21/3- best-collaborative-learning-lesson-plans-for-middle- school a-c) Homeostasis - Reading Material: Kahn Academy Homeostasis article (pdf in folder) - Activity: Homeostasis and Negative Feedback worksheets (in folder) - Lab: Heart rate Lab (in folder and online) https://www.trschools.k12.wi.us/faculty/JBRUNETTE/ cms files/assignment_attach/7052/CopyofHomeostasis andHeartRateLabTemplate.pdf

Investigation 3	Investigation 3	Investigation 3	Investigation 3	Investigation 3	Investigation 3
HS-LS1-6	3. What causes muscles to	3. What causes muscles	3. What causes	3. What causes	3. What causes muscles to burn during and delayed
HS-LS1-7	burn during and delayed	to burn during and	muscles to burn	muscles to burn	muscle soreness after a workout?
	muscle soreness after a	delayed muscle soreness	during and delayed	during and delayed	**Collaborative Activities**
	workout?	after a workout?	muscle soreness after a	muscle soreness	I)Communication skill
	OUEST #1	Vocabulary	workout?	after a workout?	- What's Your Point? Activity
	a) What are chemical	Compound, element.	**Summative		https://www.dol.gov/odep/topics/vouth/softskills/Com
	compounds?	ions, periodic table,	Assessment: OUEST #1		munication.pdf
	b)What happens to chemical	chemical reaction.	2.Use a model to		- Ôh. Puh-leeeeeeze! Activity
	bonds during chemical	reactant, product, ATP.	illustrate that cellular		https://www.dol.gov/odep/topics/vouth/softskills/Com
	reactions?	cellular respiration.	respiration is a		munication pdf
	c) What is energy?	aerobic anaerobic	chemical process		- What do you admire about people in
	d) Where do organisms get	glycolysis NAD+ Krebs	whereby the bonds of		vour life?
	energy and how do they use	cycle matrix	food molecules and		https://www.aeseducation.com/blog/what-is-
	it? (What is ATP?)	fermentation	avygan moloculos ara		collaborative learning and how do you use it
	a) What is cellular	Termentation	broken and the bonds		2
	respiration? (How can we	Sugar molecules contain	in new compounds ere		L IDTeem Building
	demonstrate "process?")	carbon hydrogen and	formed resulting in a		- Kagan Activity (refer to Kagan book)
	f) What happens during the	ovugen: their	not transfor of anores		The Line Came, Collaborative learning
	ny what happens during the	bydrocorbon boolthors-	net transfer of energy.		- The Line Game- Collaborative learning
	a) What harmons during the	nydrocarbon backbones	(Construct and navias on		https://www.esseducation.com/husinesseenter21/2
	g) what happens during the	are used to make amino	(Construct and revise an		https://www.aeseducation.com/businesscenter21/5-
	Krebs Cycle?	acids and other carbon-	explanation based on		best-conaborative-learning-lesson-plans-lor-middle-
	n) How does the electron	based molecules that can	evidence for now		<u>school</u>
	transport chain use high-	be assembled into larger	carbon, hydrogen and		Test #1
	energy electrons from	molecules (such as	oxygen from sugar		a-b) The Nature of Matter
	glycolysis and the Krebs	proteins or DNA), used	molecules may combine		- Case Study Introduction (pdf in
	cycle?	for example to form new	with other elements to		folder): Maxed out Muscles- change
	1) How much ATP does	cells.	form amino acids and/or		story to training for cross country
	cellular respiration generate?		other large carbon-based		- Content in textbook: Nature of Matter
	k)How do organisms generate	Organisms get energy	molecules. MAYBE)		PP. 42-46 and Chemical Reactions pp
	energy when oxygen is not	from food. Cellular			58-59 in Biology textbook
	available?	respiration is a process	**Summative		- Demo: Chemical Reaction (ask
	PROJECT	that releases energy from	Assessment: Project-		Deering)
	a)How does the body produce	food in presence of	Exercise Calendar for		c-e) Overview of Cellular Respiration
	ATP during different stages	oxygen. There are three	Max		- Content in textbook: Cellular
	of exercise?	stages: glycolysis, the	-Rubric for exercise		Respiration an Overview PP 310-312
	b)How do muscles cause	Krebs Cycle, and electron	plan		- Activity: How do Organisms Use
	movement and provide	transport chain.	3.Explain how muscles		Energy? Wkst (in folder)
	support?		cause movement.		- Activity: Using Models to Understand
	c)What causes the burning	During glycolysis, 1	4.Construct a fitness		Cellular Respiration west (in folder)
	sensation during intense	molecule of glucose is	plan that explains the		- Activity: Modeling Process by building
	exercise?	transformed into 2	cause of the muscle		- mershmallow cube from toothnicks
	d)What causes muscle	molecules of pyruvic	fatigue and soreness of		f i) The Dreeses of Cellular Permittion
	soreness after an intense	acid. During the Krebs	the two athletes and		(1-1) The Process of Centuar Respiration
	workout?	cycle, pyruvic acid is	ways they can meet		- Content in textbook. Flocess of
		broken down into carbon	their fitness goals.		Deliular respiration PP. 314-320 III Biology textbook
		dioxide in a series of	Cooperative Objective		Diology textbook
		energy extracting	1.Communicate with		- Activity: Iviake a video on your phone
		reactions. The electron	group members how		or the Cellular Respiration Process
		transport chain uses the	they can improve		using Game Pieces (use Key for
1	1	1	v	1	Shorter version of Using Models to

1.1 1.	1 1 1 14	Lindensteind Colluler Drawforther
nigh-energy electrons	snaring research with	Understand Cellular Respiration
from glycolysis and the	the group.	wkst)…Rubric for project?
Krebs Cycle to convert		j) Fermentation
ADP into ATP. Together.		- Content in textbook: Fermentation
glycolysis the Krebs		PP 321-323 in Biology Text
guala and the algotron		Caso Study Quick Laby n. 222 in Biology
cycle and the electron		- Case Study-Quick Lab. p. 525 III Biology
transport chain release		text
about 36 molecules of		PROJECT
ATP per molecule of		a a) Energy and Evergica
glucose.		a-c) Energy and Exercise
-		- Content in textbook: Energy and
In absence of oxygen		Exercise PP. 324-325 in Biology
glycolysis is kept going		textbook
by the pathway of		 Activity: How do muscles get energy
forme antestion and is h		worksheet (pdf in folder)
Termentation, which		- Reading: Scientific American Soreness
releases energy from food		articles (updated versions?)
molecules by producing		- Presentation : Mr. Fry video and/or leff
ATP. For short, quick		Collins on workout plan
bursts of energy, the body		
uses ATP already in		
muscles as well as ATP		
made by lactic acid		
fermentation For		
evenues longer than 00		
exercise longer than 90		
seconds, cellular		
respiration is the only		
way to continue		
generating a supply of		
ATP.		
Skeletal system supports		
the heady motests internal		
the body, protects internal		
organs, assists in		
movement, stores		
minerals, and produces		
red blood cells. Bones are		
a solid network of living		
cells. Joints permit bones		
to move without		
damaging each other		
There are three types of		
mugale tique amonth		
muscle ussue: smooth,		
skeletal and cardiac.		
Skeletal muscles pull on		
body parts are they		
contract.		

Unit Three							
Independent Relationships in Ecosystems (9-11 weeks)							
STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL STANDARDS & CONNECTIONS	SUGGESTED ACTIVITIES		
Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1		
Investigation 1 HS-LS2-3 HS-LS2-5	Investigation 1 I.Can we construct an enclosed ecosystem that could sustain plant life? TEST #1 a. What is Bisophere 2? b.What molecules make up life? What elements does carbon bond with to make up life's molecules? c. What are the functions of each of the four groups of macromolecules? d.What is photosynthesis and how does it compare to cellular respiration? e. How do consumers obtain energy and nutrients? (Photosynthesis and cellular respiration) f. How does water cycle globally? g. What is the important of the main nutrient cycles? h. How does nutrient availability affect primary productivity?	Investigation 1 I.Can we construct an enclosed ecosystem that could sustain plant life? Vocabulary Test #1 Monomer, polymer, carbohydrates, lipid, nucleic acid, protein, amino acid, photosynthesis, biogeochemical cycle, nutrient, nitrogen fixation, denitrification, limiting nutrient (Main focus: Text) Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. Photosynthesis and cellular respiration are important components of the carbon cycle, in	Investigation 1 1.Can we construct an enclosed ecosystem that could sustain plant life? 1. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions 2. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere and geosphere. 3. Consider limitations of data analysis (e.g. measurement error, sample selection) when	CONNECTIONS Investigation 1 1.Can we construct an enclosed ecosystem that could sustain plant life? **Test#1: Summative Assessment **Project: Develop Terrarium with group members -Science Fair Rubric	Investigation 1 I.Can we construct an enclosed ecosystem that could sustain plant life? **Collaborative Activities** I)Communication skill - What's Your Point? Activity https://www.dol.gov/odep/topics/vouth/softskills/Com munication.pdf - Oh, Puh-leeeeeeeze! Activity https://www.dol.gov/odep/topics/youth/softskills/Com munication.pdf - What do you admire about people in your life? https://www.aeseducation.com/blog/what-is- collaborative-learning-and-how-do-you-use-it 2 II)Team Building - Kagan Activity (refer to Kagan book) - The Line Game- Collaborative learning practice https://www.aeseducation.com/businesscenter21/3- best-collaborative-learning-lesson-plans-for-middle- school a-c) Carbon Compounds - Engagement Activity: Life in Biosphere 2 Ted Talk- https://www.youtube.com/watch?v=a7B39MLVeIc		
	i. How is the hydroponic	which carbon is	analyzing and		- Content in textbook: Carbon		
	system designed to maintain the life of the plants? j. How can you construct a terrarium that provides all the materials to keep your plant	exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological and	interpreting data and propose a secondary experimental design.4. Compare and contrast		Compounds PP. 52-57 and Chemical Reactions pp 58-59 in Biology textbook d-i) Cycling of Matter - Activity: Mineral Cycling Through the Ecosystem (PDF in folder)		
	alive?	biological processes.	various types of data		- Activity: Introduction to the Carbon		
	k.What processes are occurring in your terrarium? L. How did your terrarium	The chemical elements that make up the molecules of organisms	sets to examine consistency of measurements and		Cycle (PDF in folder) - Activity: Carbon Cycle Practice Sheet (doc in folder(
	groups?	pass through 1000 webs	observations.		- Denio, mydroponic system		
	M.How did the expected	atmosphere and soil.	5.Design an enclosed		systems?		
	observation from your	and they are combined	ecosystem that		j-m) Designing Closed System Terrariums		
	experiment compare to the	and recombined in	demonstrates how		- Materials: Closed System Terrariums		
	observations that were observed?	different ways. At each link in an ecosystem,	energy and matter flow through the system.		https://extension.psu.edu/creating-a-closed- terrarium		

		matter and energy are			
		conserved.	Cooperative Objective		https://extension.msstate.edu/sites/default/file
			1.Reflect on learning		s/publications/publications/P3253 Terrarium.p
		Matter is recycled within	and ability to work on a		df
		and among ecosystems.	team		- Materials: How to set up experiment
		unlike the one-way flow			(ndfs in folder)
		of energy Matter cycles			(pais in lolder)
		through organisms and			
		the environment through			Alaska Nativa Knowladga Natwork Dosources
		biogeochemical cycles			Alaska Ivative Kilowieuge Ivetwork Resources
		The flow of matter can			Vuntile Dind Doole
		involve biological			tup ik biru book
		apploained aborning and			http://ankn.uar.edu/ Kesources/course/view.php?id=15
		physical processes and			Disute of Mar Doordin
		human activity. These			Plants of My People
		numan activity. These			http://ankn.uaf.edu/ANCR/Inupiaq/plantsofmypeople/i
		global processes cycle			<u>ndex.html</u>
		matter through global			
		systems. Every organism			
		needs nutrients to			Other Resources
		survive. The carbon,			Teachers Pay Teachers: Cooperative Learning Starter
		nitrogen, and phosphorus			Kit (pdf)
		cycles are especially			
		important for life. The			
		availability of nutrients			
		can influence the long-			
		term survival of			
		organisms. If amply			
		sunlight and water are			
		available, the primary			
		productivity of an			
		ecosystem may still be			Investigation 2
		limited by the availability			2.How do abiotic and biotic factors shape the
		of nutrients.			habitat where an organism lives?
					Collaborative Activities
Investigation 2	Investigation 2	Investigation 2	Investigation 2	Investigation 2	I)Communication skill
HS-LS2-6	2. How do abiotic and biotic	2.How do abiotic and	2.How do abiotic and	2.How do abiotic	 What's Your Point? Activity
	factors shape the habitat	biotic factors shape the	biotic factors shape the	and biotic factors	https://www.dol.gov/odep/topics/youth/softskills/Com
	where an organism lives?	habitat where an	habitat where an	shape the habitat	munication.pdf
	(How will Climate Change	organism lives?	organism lives?	where an organism	 Oh, Puh-leeeeeeze! Activity
	challenge the stability of the	Vocabulary	**Project: Summative	lives?	https://www.dol.gov/odep/topics/youth/softskills/Com
	marine ecosystem in the	Biotic factor, abiotic	Assessment		munication.pdf
	Bering Sea Region?)	factor, biosphere,	- Newspaper article?		 What do you admire about people in
		ecology, species,	1.Use mathematical		your life?
	a. Why is ecology important?	population, community,	representations to		https://www.aeseducation.com/blog/what-is-
	b. What are biotic and abiotic	ecosystem, atmosphere,	support explanations		collaborative-learning-and-how-do-you-use-it
	factors?	hydrosphere, geosphere,	based on evidence that		2
	c. what is the difference	climate, weather,	changing conditions		II)Team Building
	between weather and climate?	greenhouse effect	may result in a new		- Kagan Activity (refer to Kagan book)
		(Standard)	ecosystem.		- The Line Game- Collaborative learning
					practice

d How are Earth's climate	Complex set of	2 Compare graphical	https://www.asseducation.com/businesscenter21/3-
and average temperature	interactions within an	displays to support	https://www.acseducation.com/ousinessecinter21/5-
determined?	interactions within an	asplays to support	best-conaborative-rearining-resson-phans-ror-initidite-
a What factors shape regional	numbers and types of	avidence that changing	a f) Introduction to Global Systems
elimete?	arganisms volatively	conditions alter the	a-1) Introduction to Global Systems
f What does allowed a down			- Content in textbook. Diomes and
1. what does climate change	constant over long	complex interactions in	Aqualic Ecosystems PP. 10-03 and
involve?	periods of time under	numbers and types of	Climate, weather and Life pp. 85-91
g. What is algae? (stable conditions. If a	interactions between	- Climate change activities:
h. What is eutrophication?	modest biological or	organisms in an	https://www.climate.gov/teaching/learning-activities
1. What are harmful algal	physical disturbance to	ecosystem.	https://scied.ucar.edu/activity
blooms?	an ecosystem occurs, it		g-i) Algae and Eutrophication
j.Why is it important to study	may return to its more	3.Communicate findings	 Activity: Protist lab (pdf in folder: can I
the marine ecosystem of the	or less original status	through a visual display	find another that is geared specifically
NBS?	(ecosystem is resilient)	cites data analysis from	to algae in Teachers Pay Teachers?)
k. What biotic and abiotic	as opposed to becoming	one other research	- Material: Marine Phytoplankton of
factors have shaped the	a very different	group.	South Central Alaska (pdf in folder(
Northern Bering Sea marine	ecosystem. Extreme		 Activity: The Effect of Fertilizer on
ecosystem?	fluctuations in		Algae lab
1. How is climate change	conditions or the size of	Cooperative Objective	https://www.sciencebuddies.org/science-fair-
impacting the Northern	any population,	1. Select credible	projects/project-ideas/EnvSci p054/environmental-
Bering Sea?	however, can challenge	resources on the	science/effect-of-fertilizers-on-algal-growth
	the functioning of	internet.	- Resource: Eutrophication
	ecosystems in terms of		https://oceanservice.noaa.gov/facts/eutrophication.html
	resources and habitat		i-L Changes in Northern Bering Sea
	stability.	Project Component	- Presenter: Gay Sheffield
	(Standard)	Visual display with	- Material: Strait Science presentation
	Changes in the physical	graphs presentation to	- Material: NOAA Bering Sea Report
	environment whether	class	- Material: Rering Science Newsletter
	naturally occurring or	RUBBIC for display	** Activity: S1-Algae samples with
	human induced have	Robitie for display	Norton Sound Hospital
	thus contributed to the		Notion Cound hospital
	avantian of some		
	expansion of some		Other Pesources
	of now distinct species		<u>Other Resources</u>
	of new distinct species		In the Van Channels Early an fam Early With
	as populations diverge		Janice vancieave s Ecology for Every Kid:
	under unterent		Boundaries: Understanding Ecosystems and Biomes (p.
	conditions and the		(5)
	decline and sometimes		Icy Lands: Learning about Plants and Animals in Polar
	extinction of some		and Tundra Biomes (p. 83)
	species.		
	(Main Focus: 1 ext)		
	A habitat refers to the		
	physical and biological		
	environmental factors of		
	an ecosystem that affect		
	the organisms living		
	there. Every species in a		
	habitat has its own range		
	of tolerance, which are		

environmental conditions		
in which it can survive		
and reproduce. Within a		
habitat, a species		
occupies a niche, which		
includes the range of		
physical and biological		
physical and biological		
survive and reproduce.		
Competition within and		
among species helps		
determine the numbers		
and kinds of species in a		
community and the niche		
that species occupies.		
Populations of predators		
and prey, and of		
herbivores and plants,		
powerfully influence each		
other, and often cycle up		
and down over time.		
Symbiosis describes the		
interdependent		
relationships between two		
species. In		
commensalism, one		
organism benefits and		
other is neither helped		
nor harmed. In		
mutualism both species		
henefit A parasitic		
relationship is one in		
which one organism lives		
inside or on another		
organism.		
Instantion 2		
Investigation 2		
vocabulary terms:		
population density,		
population distribution,		
age structure,		
immigration, emigration,		
exponential growth,		
logistic growth, carrying		
capacity, limiting factor,		
density-dependent		
limiting factor, density-		
independent limiting		
factor	1	

		(Text content) Ecologists study populations by examining their geographic range, growth rate, density and distribution, and age structure. For a population to increase the number of births			
Investigation HS-LS2-1	Investigation 2 What factors contribute to changes in populations? How do ecologists study populations? What factors affect population growth? What happens during exponential growth? What is logistic growth? What is logistic growth? What is logistic growth? What factors determine carrying capacity? What limiting factors depend on population density? What limiting factors do not typically depend on population density? How has human population size changed over time? Why do population growth rates differ among countries?	Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors such as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. **Note: Proceed with <u>Investigation 4</u> Anthropogenic changes (induced by human activity) in the environment- including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change- can disrupt an ecosystem and threaten the survival of some species. Biodiversity is increased by the formation of new species (speciation) and	Investigation 2 1.Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. 2.Construct a claim as a team supported by evidence that explains why and how a population can experience exponential growth.	Investigation 2 Edit Chapter Mystery to be more place- based E.Culturally- knowledgeable students demonstrate an awareness and appreciation of the relationships and processes of interaction of all elements in the world around them. 2.Understand the ecology and geography of the bioregion they inhabit	

		decreased by the loss of			
		human activity is also			
		having adverse impacts			
		on biodiversity through			
		overpopulation.			
		overexploitation, habitat			
		destruction, pollution,		allows.	
		introduction of invasive			
		species and climate		Investigation 4	
		change. Thus sustaining		_	Investigation 2
		biodiversity so that		Edit activity to be	Chapter Mystery: A Plague of Rabbits (p. 129 in Miller
		ecosystem functioning		more place-based	& Levine Biology textbook)
		and productivity are			
		maintained is essential to		E.Culturally-	Impacts of Climate Change on Caribou lesson plan
		supporting and enhancing		knowledgeable	(pdf)
		hiediversity also aids		students demonstrate	ADE&G Poor Curriculum: Corruing Consoity losson
		humanity by preserving		an awareness and	nlan
		landscapes of recreational		relationships and	pian
	Investigation 4	or inspirational value.		processes of	Populations Explosions lesson plan (pdf)
	(Overarching question)	r		interaction of all	F F
	How have human activities			elements in the world	Caribou Trails newsletter (paper copies and pdf
Investigation 4	shaped local and global			around them.	versions available)
	ecology?				
HS-LS2-7	How do our daily activities			2.Understand the	Other Resources
	affect the environment?		x	ecology and	
	why is soil important, and		Investigation 4 if time	geography of the	
	What is the primary sources		Investigation A	inhabit	
	of water pollution?		1 Design evaluate and	mnaon	
	What are the major forms of		refine a solution for		
	air pollution?		reducing the impacts of		
	Why is biodiversity		human activities on the		
	important?		environment and		
	What are the most significant		biodiversity.		
	threats to biodiversity?				
	How do we preserve		2. Write a magazine		
	biodiversity?		article that cites		
	How does the average		evidence from research		
	ecological footprint in		supporting an argument		
	America compare to the		as to now European		
	How can ecology guide us		Pacific Northeast as		
	toward a sustainable future?		well as a workable		
			solution for increasing		
			the native population of		
			mussels while		
1		1			
			containing or decreasing		

			the European green crab		
			population. (Project)		
					Investigation 4
					Problem-based Learning Activity: Disappearing Mussels! (p. 61a-61b in Miller and Levine Biology textbook)
					Mitigation and Adaptation lesson plan (pdf) Population Explosions lesson plan (pdf)
					Fire and Forest: Interactions of Wildlife and Permafrost lesson plan (pdf)
					Janice VanCleave's Ecology for Every Kid Water Problems: The Problems of Water Pollution and How to Solve Them (p. 133) Global Warming: What the Greenhouse Effect is (p. 139)
					Good and Bad: How Plastics Affect the Environment (p. 147) Acid Rain: The Causes and Effects of Acid Rain (p.
					 155) Buildup: Where Most of Your Garbage Goes (p. 171) Reusable: Learning About Renewable Energy Sources (p. 177) Endangered: Learning About Endangered Animals (p.
					193)
			Unit Four		
	I	Heredity: Inheritan	ce and Variation	of Traits (3-4 w	eeks)
STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL STANDARDS & CONNECTIONS	SUGGESTED ACTIVITIES
Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1
HS-LS3-1	(Overarching Question)	F 1 1			
HS-LS3-2	What is the structure of DNA,	Each chromosome	1.Ask questions to		Problem-based Activity: To Eat or Not to Eat (Miller
	genetic inheritance?	long DNA molecule and	about the role of DNA		a Levine realbook p. 505a-5050)
	generie internatioe.	each gene on the	and chromosomes in		DNA Extraction lesson plan (pdf)
	What clues did bacterial	chromosome is a	coding the instructions		Investigating DNA lesson plan (pdf)
	transformation yield about the	particular segment of that	for characteristic traits		Mad Mutation lesson plan (pdf)
	gene?	DNA. The instructions	passed from parents to		Issues in Genetics lesson plan (pdf)
	what fole did bacterial	for forming species	onspring.		Hands-On General Science Activities with Peol Life
	genetic material?	in DNA. All cells in an			Applications book

What is the role of DNA in organism have the same 2 Made and defend a The Blueprint of Life activity (n. 211)							
heredity?	organishi have the same	2. What and defend a		Designs for Distaine activity (p. 216)			
What are the showing 1	genetic content, but the	that inheritable anotic		Mensterne Materiana estivity (p. 210)			
what are the chemical	genes used (expressed)	that inneritable genetic		Monstrous Mutations activity (p. 255)			
components of DNA?	by the cell may be	variations may result					
what clues helped scientists	regulated in different	from; a)new genetic					
solve the structure of DNA?	ways. Not all DNA codes	combinations through					
What does the double-helix	for a protein; some	meiosis, b) viable errors					
model tell us about DNA?	segments of DNA are	occurring during					
What role does DNA	involved in regulatory or	replication and/or c)					
polymerase play in copying	structural functions, and	mutations caused by					
DNA?	some have no as-yet	environmental factors.					
How does DNA replication	known function.						
differ in prokaryotic cells and		3.Construct a claim					
eukaryotic cells?	In sexual reproduction,	based on evidence from					
	chromosomes can	research about whether					
(Overarching Question)	sometimes swap during	you support or oppose					
How does information flow	the process of meiosis	the development and					
from DNA to RNA to direct	(cell division), thereby	distribution of GM					
the synthesis of proteins?	creating new genetic	foods. (Project)					
	combinations and thus						
How does RNA differ from	more genetic variation.						
DNA?	Although DNA						
How does the cell make	replication is tightly						
RNA?	regulated and remarkably						
What is the genetic code, and	accurate, errors do occur						
how is it read?	and result in mutations,						
What role does the ribosome	which are also a source of						
play in assembling proteins?	genetic variation.						
What is the "central dogma"	Environmental factors						
of molecular biology?	can also cause mutations						
How do mutations affect	in genes, and viable						
genes?	mutations are inherited.						
How are prokaryotic genes							
regulated?	Environmental factors						
How are genets regulated in	also affect expression of						
eukaryotic cells?	traits, and hence affect						
What controls the	the probability of						
development of cells and	occurrences of traits in a						
tissues in multicellular	population. Thus the						
organisms?	variation and distribution						
	of traits observed						
	depends on both genetic						
	and environmental						
	factors.						
		I.I •4 I.S					
		Unit Five					
Biological Evolution: Unity and Diversity (6-8 weeks)							

STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUGGESTED ACTIVITIES
	-			STANDARDS &	
				CONNECTIONS	
Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1	Investigation 1
HS-LS4-1	(Overarching Question)	_	_		
HS-LS4-2	What is natural selection?	Genetic information	1.Communicate		Chapter Mystery: Murder in the Permian (p. 536-537
		provides evidence of	scientific information		in Miller & Levine Biology Textbook)
	What was Charles Darwin's	evolution. DNA	that common ancestry		
	contribution to science?	sequences vary among	and biological evolution		Researching Natural Selection lesson plan (pdf)
	What three patterns of	species, but there are	are supported by		Fossil Hunt lesson plan (pdf)
	biodiversity did Darwin note?	many overlaps; in fact,	multiple lines of		
	What did Hutton and Lyell	the ongoing branching	empirical evidence.		**Guest Presenter from NorthWest Campus or
	conclude about Earth's	that produces multiple			paleontologist from UAF
	history?	lines of descent can be	2.Construct an		
	How did Lamarck propose	inferred by comparing the	explanation based on		
	that species evolve?	DNA sequences of	evidence that the		
	What was Malthus's view of	different organisms. Such	process of evolution		
	population growth	information is also	primarily results from		
	How is inherited variation	derivable from the	tour factors: a) the		
	used in artificial selection?	similarities and	potential for a species to		
	Under what conditions does	differences in amino acid	increase in number, b)		
	natural selection occur?	sequences and from	the heritable genetic		
	What does Darwin's	anatomical and	variation of individuals		
	mechanism for evolution	embryological evidence.	in a species due to		
	suggest about living and	National and a start and a second	mutation and sexual		
	extinct species?	Natural selection occurs	reproduction, c)		
	How does the geographic	only if there is both 1)	competition for limited		
	alstribution of species today	information hatwaan	resources and d) the		
	history?	argonigms in a nonulation	organisms that are better		
	How do fossils help to	and 2) variation in the	able to survive and		
	document the descent of	and 2) variation in the	reproduce in the		
	modern species from ancient	information- that is trait	environment		
	ancestors?	variation- that leads to	environment		
	How do homologous	differences in			
	structures and similarities in	performance among			
	embryonic development	individuals.			
	suggest about the process of				
	evolutionary change?	Evolution is a			
	How can molecular biology	consequence of the			
	be used to race the process of	interaction of four			
	evolution?	factors: 1) the potential			
		for a species to increase			
	(Overarching Question)	in number, 2) the genetic			
	How do fossils help biologists	variation of individuals in			
	understand the history of life	a species due to mutation			
	on Earth?	and sexual reproduction			
	What do fossils reveal about	3) competition for an			
	ancient life?	environment's limited			
		supply of the resources			

	How do we date events in Earth's history? How was the geologic time scale established, and what are its major divisions? How have our planet's environment and living things affected each other to shape the history of life on Earth?	that individuals need in order to survive and reproduce and 4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment.						
Investigation 2 HS-LS4-3 HS-LS4-4	Investigation 2 (Overarching Question) How can populations evolve to form new species? How is evolution defined in genetic terms? What are the sources of genetic variation? What determines the number of phenotypes for a given trait? How does natural selection affect single-gene and polygenic traits? What is genetic drift? What conditions are required to maintain genetic equilibrium? What types of isolation lead to the formation of a new species? What is a current hypothesis about Galapagos Finch speciation? What are molecular clocks? Where do new genes come from? How may Hox genes be involved in evolutionary change?	Investigation 2 (HS-LS4-2) The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the different survival and reproduction or organisms in a population that have an advantageous heritable trait leads to an increase in proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not.	Investigation 2 1.Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. 2Construct an explanation based on evidence for how natural selection leads to adaptation of populations. 3. Develop a claim based on empiracle evidence regarding how climate change has impacted the biomes and ecosystems in which you live and what can be done to raise local awareness. (project)	Investigation 2	Investigation 2 Problem-based Activity: The Alpine Chipmunk's Genetic Decline (p. 447a-447b in Miller & Levine Biology Textbook) Variation and Selection lesson plan (pdf) Hands-On General Science Activities with Real-Life Applications book Changes and Adaptations: Changing with the Times (p. 244) Changes and Adaptations: Plant Production (p. 247)			
	NAME OF UNIT (SUGGESTED TIME FRAME IN WEEKS)							

STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUGGESTED ACTIVITIES
				CONNECTIONS	
	NA	ME OF UNIT (SU	GGESTED TIME	E FRAME IN W	EEKS)
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STANDARDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUGGESTED ACTIVITIES
				STANDARDS & CONNECTIONS	



NAME OF UNIT (SUGGESTED TIME FRAME IN WEEKS)						
STANDARDS	ESSENTIAL OUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUCCESTED ACTIVITIES	
STANDANDS	ESSENTIAL QUESTIONS	UNIT CONTENT	UNIT OUTCOMES	STANDARDS &	SUGGESTED ACTIVITIES	
				CONNECTIONS		



NAME OF UNIT (SUGGESTED TIME FRAME IN WEEKS)							
STANDARDS	ESSENTIAL OUESTIONS	UNIT CONTENT	UNIT OUTCOMES	CULTURAL	SUGGESTED ACTIVITIES		
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				CONNECTIONS			
				CONNECTIONS			

