Grade 9-12 Science Standards			Daytime Classes	Animal Signs	Beavers	Birds	Small Mammals	Snowshoe Hare	White-tailed Deer	Wildlife Mgmt	Forest Ecology	Plant Study	Trees and Keys	Wetlands Ecology	Lake Study	Stream Study	Fisheries Mgmt	Frozen Lake Study	Acid Rain	Climate & Phenology	Energy & CO2	Geology	Weather	Living Lightly	Natures Timing	Ojibwe Heritage	Ojibwe Snowshoe	Seeds of Change	Voyageur Life	Adventure Ropes Course	Rock Climbing	Basic Survival	F.I.R.S.T Games	Beginning Orienteering	Competitive Orienteering	Canoeing	Cross Country Skiing	Superior Snowshoe	Superior View Hike	Evening Activities	Astronomy	Block Printing	Creative Expressions	Creature from Wolf Lake	Dream Catchers	Lake Superior Game	Night Hike	Ol Pellets	Paper Making Star Lab	Woodland Art	Volleyball	Naturalist Programs	Bats	Fur Trade	History of the North Shore	Logging Camp Life	Raptors	Frozen Beans
Strand I. History and Nature of Science																																																											
Substrand	**Standard**	**Benchmarks**																																																										
A. Scientific World View	The student will understand the nature of scientific ways of thinking and that scientific knowledge changes and accumulates over time.	1. The student will: Be able to distinguish among hypothesis, theory and law as scientific terms and how they are used to answer a specific question.																		1	1	1																																						
		2. Be able to explain how scientific and technological innovations as well as new evidence can challenge portions of or entire accepted theories and models including but not limited to cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease and big bang theory.																				2																																						
		3. Recognize that in order to be valid, scientific knowledge must meet certain criteria including that it: be consistent with experimental, observational and inferential evidence about nature; follow rules of logic and reporting both methods and procedures; and, be falsifiable and open to criticism.													3	3			3	3	3																																							
		4. Explain how traditions of ethics, peer review, conflict and general consensus influence the conduct of science.																		4	4																																							
		5. Recognize that some scientific ideas are incomplete, and opportunity exists in these areas for new advances.				5													5	5	5		5																																						
B. Scientific Inquiry	The student will design and conduct a scientific investigation.	1. The student will: Design and complete a scientific experiment using scientific methods by determining a testable question, making a hypothesis, designing a scientific investigation with appropriate controls, analyzing data, making conclusions based on evidence and comparing conclusions to the original hypothesis and prior knowledge					1								1	1																																														

Wolf Ridge ELC Minnesota Academic Standards Matrix

Grade 9-12 Science Standards			Daytime Classes	Animal Signs	Beavers	Birds	Small Mammals	Snowshoe Hare	White-tailed Deer	Wildlife Mgmt	Forest Ecology	Plant Study	Trees and Keys	Wetlands Ecology	Lake Study	Stream Study	Fisheries Mgmt	Frozen Lake Study	Acid Rain	Climate & Phenology	Energy & CO2	Geology	Weather	Living Lightly	Natures Timing	Ojibwe Heritage	Ojibwe Snowshoe	Seeds of Change	Voyageur Life	Adventure Ropes Course	Rock Climbing	Basic Survival	F.I.R.S.T Games	Beginning Orienteering	Competitive Orienteering	Canoeing	Cross Country Skiing	Superior Snowshoe	Superior View Hike	Evening Activities	Astronomy	Block Printing	Creative Expressions	Creature from Wolf Lake	Dream Catchers	Lake Superior Game	Night Hike	Ol Pellets	Paper Making Star Lab	Woodland Art	Volleyball	Naturalist Programs	Bats	Fur Trade	History of the North Shore	Logging Camp Life	Raptors	Frozen Beans
		2. Distinguish between qualitative and quantitative data.																		2																																							
		3. Apply mathematics and models to analyze data and support conclusions.				3														3																																							
		4. Identify possible sources of error and their effects on results.													4	4				4										4																														
		5. Know that professional scientists and engineers have ethical codes.					5				5										5	5									5																													
		6. Give examples of how different domains of science use different bodies of scientific knowledge and employ different methods to investigate questions.																													6																													
C. Scientific Enterprise	The student will understand the relationship between science and technology and how both are used.	2. The student will: Provide an example of a need or problem identified by science and solved by engineering or technology.																		2	2	2																	2																					
		3. Provide an example of how technology facilitates new discoveries and the development of scientific knowledge.																			3	3																																						
		4. Know that the technological changes and scientific advances are often accompanied by social, political, environmental and economic changes.				4					4			4					4	4	4					4	4	4																																
		5. Recognize that science and technology are influenced by cultural background and beliefs and by social needs, attitudes, values and limitations.														5		5		5	5					5	5																																
D. Historic Perspectives	The student will recognize the historical and cultural context of scientific endeavors and how they influence each other.	1. The student will: Be able to trace the development of a scientific advancement, invention or theory and its impact on society.																			1	1																																						
		2. Provide examples of scientific advancements contributed by other civilizations and cultures.																								2																																	
II. Physical Science																																																												
Substrand	**Standard**	**Benchmarks**																																																									
A. Structure of Matter.	The students will understand the nature of	5. The student will: Explain how neutral atoms become ions.													5				5																																								

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	matter including its forms, properties and interactions	7. Compare and contrast the states of matter in terms of interactions between particles.																					7																																				
B. Chemical Reactions	The student will describe chemical reactions and the factors that influence them.	1. The student will: Describe chemical reactions using words and symbolic equations.																	1																																							
		5. Describe how combining acids and bases produce a neutral solution.														5																																										
C. Energy Transformations	The student will understand energy forms, transformations and transfers.	7. The student will: Describe the risks and benefits of fossil fuels, renewable sources and nuclear power as sources of usable energy.																	7																																							
III. Earth and Space Science																																																											
Substrand	**Standard**	**Benchmarks**																																																								
A. Earth Structure and Processes	The students will understand that the interactions of the atmosphere, biosphere, lithosphere, hydrosphere and space have resulted in ongoing change of the Earth system over geologic time.	1. The student will: Identify the internal and external sources of energy for the Earth.																		1	1																																						
		2. Apply the laws of thermodynamics to explain the cycling of materials and transfer of energy in the Earth system.																					2																																			
		3. Illustrate how biological processes have played significant roles in determining the character of the atmosphere, biosphere, hydrosphere and lithosphere over time.																		3	3																																						
		4. Use the theory of plate tectonics to analyze relationships among earthquakes, volcanoes, mountain fossil deposits, rock layers and ocean features.																				4																																				
		5. Describe how glaciers, gravity, wind, temperature changes, waves and rivers cause weathering and erosion.																				5																																				
		6. Describe the rock cycle and compare and contrast the processes responsible for the formation of igneous, sedimentary and metamorphic rocks.																				6																																				

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		7. Use evidence found in fossils, rock layers, ice cores, radiometric dating and globally gathered data to explain how Earth has changed over short and long periods of time.																		7	7																																						
A. Earth Structure and Processes	The student will investigate the impact humans have on the environment.	1. The student will identify and research an environmental issue and evaluate its impact.								1	1			1	1	1	1	1	1	1	1	1				1	1												1																					
B. The Water Cycle, Weather and Climate	The student will explain the causes and effects of the Earth's atmospheric and hydrologic processes.	1. The student will: Explain how the transfer of energy and motions of the Earth contribute to global climatic processes including wind, waves and ocean currrents.																		1	1		1																																					
		2. Trace the cyclical movement of carbon and water through the lithosphere, hydrosphere, atmosphere and biosphere.																		2	2		2																																					
		3. Demonstrate the effect of the Earth's tilt, rotation and revolution on the seasons, day length and tide.																					3																																				
		4. Identify, predict and investigate the factors that influence the quality of water and how it can be reused, recycled and conserved.												4	4	4	4	4	4																				4																					
		5. Discuss the impact of the use of natural resources and other human activities on the Earths' climate.																	5	5	5																																						
IV. Life Science																																																											
Substrand	**Standard**	**Benchmarks**																																																									
B. Diversity of Organisms	The student will classify, compare and contrast the diversity of organisms on Earth and their modes of accomodating the requirements for life.	2. The student will: Recognize that organisms have both innate and learned behavioral responses to internal and external stimuli, including the tropic responses in plants.		2			2					2																																																
C. Interdependence of Life	The student will describe how the environment and interactions between organisms can affect the number of	1. The student will: Describe the factors related to matter and energy in an ecosystem that both influence fluctuations in population size and determine the carrying capacity of a population.				1										1	1	1																																										

Grade 9-12 Science Standards			Daytime Classes	Animal Signs	Beavers	Birds	Small Mammals	Snowshoe Hare	White-tailed Deer	Wildlife Mgmt	Forest Ecology	Plant Study	Trees and Keys	Wetlands Ecology	Lake Study	Stream Study	Fisheries Mgmt	Frozen Lake Study	Acid Rain	Climate & Phenology	Energy & CO2	Geology	Weather	Living Lightly	Natures Timing	Ojibwe Heritage	Ojibwe Snowshoe	Seeds of Change	Voyageur Life	Adventure Ropes Course	Rock Climbing	Basic Survival	F.I.R.S.T Games	Beginning Orienteering	Competitive Orienteering	Canoeing	Cross Country Skiing	Superior Snowshoe	Superior View Hike	Evening Activities	Astronomy	Block Printing	Creative Expressions	Creature from Wolf Lake	Dream Catchers	Lake Superior Game	Night Hike	Ol Pellets	Paper Making Star Lab	Woodland Art	Volleyball	Naturalist Programs	Bats	Fur Trade	History of the North Shore	Logging Camp Life	Raptors	Frozen Beans
	species and the diversity of species in an ecosystem.	2. Explain how adaptations of species and co-evolution with other species are related to success in an ecosystem.			2		2							2		2	2	2										2																														
		3. Identify examples of mutualism, commensalism, and parasitism in a stable ecosystem.										3				3																																									
		4. Predict and analyze how a change in an ecosystem, resulting from natural causes, changes in climate, human activity or introduction of invasive species, can affect both the number of organisms in a population and the biodiversity of species in the ecosystem.				4			4	4				4	4	4	4	4		4	4																																					
D. Heredity	The student will explain how inherited characteristics are encoded by genes.	2. The student will: Define the relationship between DNA, genes and chromosomes.																										2																													
		3. Describe the structure and function of DNA and distinguish between replication, transcription and translation.																										3																													
		7. Differentiate between dominant, recessive, co-dominant, incompletely dominant, polygenic and sex-linked traits.																										7																													
E. Biological Populations Change Over Time	The student will understand how biological evolution provides a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.	1. The student will: Understand that species change over time and the term biological evolution is used to describe this process.			1	1		1						1				1								1																															
		2. Use the principles of natural selection to explain the differential survival of groups of organisms as a consequence of: - The potential for a species to increase its numbers; - The genetic variability of offspring due to mutation and recombination of genes; - A finite supply of the resources required for life; and, - The ensuing		2	2	2	2	2						2	2							2																	2																		

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